BEST PRACTICABLE ENVIRONMENTAL OPTION (BPEO) ASSESSMENT

MAINTENANCE DREDGING OF BERTHS AND APPROACHES AT ABERDEEN HARBOUR

October 2021 (Revision 6)

Aberdeen Harbour Board
Harbour Office
16 Regent Quay
Aberdeen
AB11 5SS

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DOCUMENT HISTORY

Revision Number	**Date**
Revision 1	March 2015
Revision 2	November 2017
Revision 3	February 2018
Revision 4	1 December 2020
Revision 5	3 December 2021
Revision 6	13 October 2021

1. INTRODUCTION

1.1. Background

Aberdeen Harbour is the major port serving the North East of Scotland. There are approximately 8,000 vessel arrivals and 5 million tonnes of cargo handled each year, with the harbour supporting 10,000 full time equivalent jobs. It is also the mainland port for the lifeline service to the Northern Isles and as well as general cargo and passengers. Aberdeen is the largest support harbour for the North Sea Energy Industry.

As a statutory harbour authority, Aberdeen Harbour Board (AHB) is required to carry out maintenance dredging of the main navigation channels and berths (shown on Figure 1) to maintain safe navigable depths and support customers' business needs. Clause 72 of the Aberdeen Harbour Order (Confirmation) Act 1960 gives AHB powers to dredge within its statutory harbour limits.

This report presents the Best Practicable Environmental Option (BPEO) assessment for the fate of maintenance dredged material from Aberdeen Harbour. BPEO assessment is a method for identifying the option that provides the *most environmental benefit* or *least environmental damage*. It assesses the performance of different options using a range of criteria such as environmental impact, technical feasibility and cost.

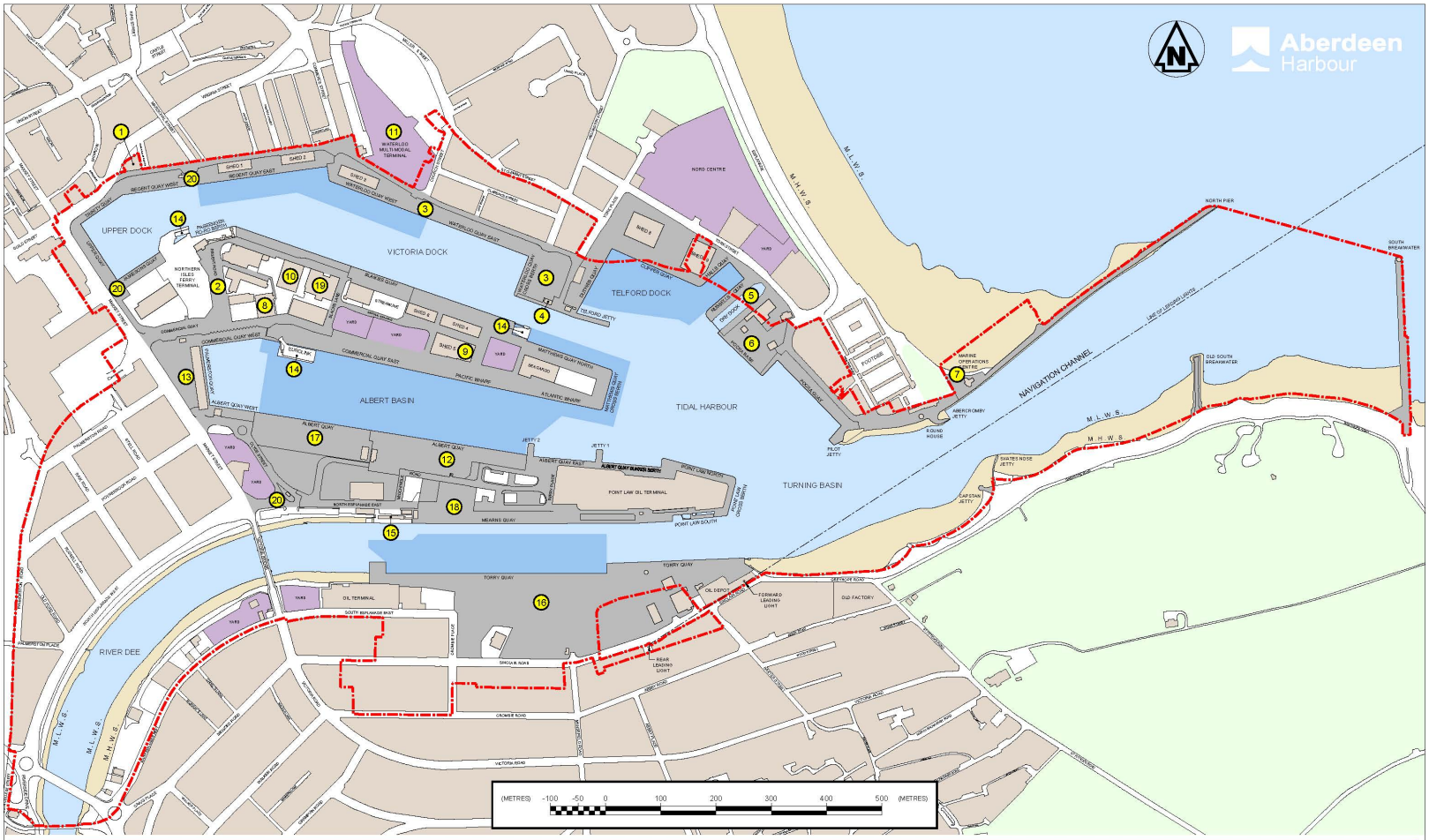
1.2. Source of Materials

Aberdeen Harbour has been built on the former delta at the mouth of the River Dee. Both the harbour and the entrance channel are susceptible to continued progressive natural infilling from two sources:

a) River-borne silts and muds; and
b) Sea-borne sands

In 1986, AHB commissioned HR Wallingford Ltd to study the siltation at the harbour entrance (see Appendix 1). The results concluded that the sediment transport is due to a complex action of tides, currents and wave action and consequently cannot be controlled.

In addition, the siltation of harbour berths is caused by the river silt being carried down the River Dee to the harbour. There the natural current takes some of this material anticlockwise around the Point Law headland where it is deposited at the harbour berths.



HARBOUR MAP 2013

KEY:

1. HARBOUR OFFICE
2. WEIGHBRIDGE
3. PETERSON-SBS
4. LIFEBOAT STATION
5. DRY DOCK
6. PETERSON-SBS
7. MARINE OPERATIONS CENTRE
8. MULTI-STOREY CAR PARK
9. GRAIN EXPORT TERMINAL
10. HARBOUR MAINTENANCE DEPARTMENT
11. PETERSON-SBS
12. BP EXPLORATION BASE
13. FISH MARKET
14. RO-RO RAMPS
15. PETROFAC TRAINING CENTRE
16. TORRY MARINE BASE
17. TOTAL E&P UK BASE
18. MEARNS QUAY BASE
19. MARITIME COASTGUARD AGENCY
20. SECURITY GATEHOUSE

- HARBOUR BOUNDARY 1960
- HARBOUR ROADS AND QUAYSIDES
- YARDS
- DEEPWATER BERTHS

2. DESCRIPTION OF DREDGING

2.1. Dredging Methodology

AHB has a record of dredging going back around 200 years, although it is likely that dredging has been ongoing in some form throughout Aberdeen Harbour's 900+ year history. In recent years, maintenance dredging has been carried out mainly with a trailer suction hopper dredger, working in conjunction with a bed levelling tug. The latter is used to smooth out any high spots left by the suction dredger. The dredged material is taken by the trailer suction hopper dredger to the designated offshore deposit site Aberdeen CR110, approximately 2.5 nautical miles to the southeast of the harbour entrance, as shown in Figure 2.

The annual maintenance dredging campaign is typically carried out once a year within the areas shown in Figure 3, although sometimes an additional winter dredging campaign is required due to inundated accretion of material in the navigation channel and River Dee caused by severe winter storms.

The annual maintenance dredging campaign is typically carried out in spring each year, after any winter storms, depending on the availability of dredging plant. The duration of the campaign will vary from one to four weeks depending on the dredge volumes.

The volume of material removed annually from the harbour and channel varies between 100,000 to 200,000 m^3 in-situ sand and silt.

Occasionally, deepening of sections of the harbour beyond the maintained depth is carried out to improve the facilities available to shipping; however, any such capital dredging is subject to a separate marine licence application and is outside the scope of this BPEO Assessment.

2.2. Material to be dredged

In October 2020, 10 surface grab samples were collected from the areas to be dredged, as agreed with Marine Scotland – Licensing Operations Team (MS-LOT). Sediment samples were analysed for the Marine Scotland suite of parameters. A summary of the results is presented in this section and the full results are provided in Appendix 2.

2.2.1 Comparison with Marine Scotland Revised Action Levels

The results have been compared to the Marine Scotland Revised Action Levels, which are used to determine the contaminant loading of the material and its suitability for deposition at sea. Levels of some heavy metals (cadmium, chromium, copper, and nickel) were elevated above Marine Scotland Revised Action Level 1 in up to five of the samples analysed. In all cases the levels were well below Action Level 2. Levels of polychlorinated biphenyls and tributyl tin were below Action Level 1 in all samples.

Levels of polycyclic aromatic hydrocarbons (PAHs) were elevated above Action Level 1 in seven of the samples analysed. Levels in the 2020 samples did not exceed the levels observed in samples collected for recent marine licence applications for deposition (2015 – 2019). PAH levels are within those expected from the Aberdeen Harbour area.

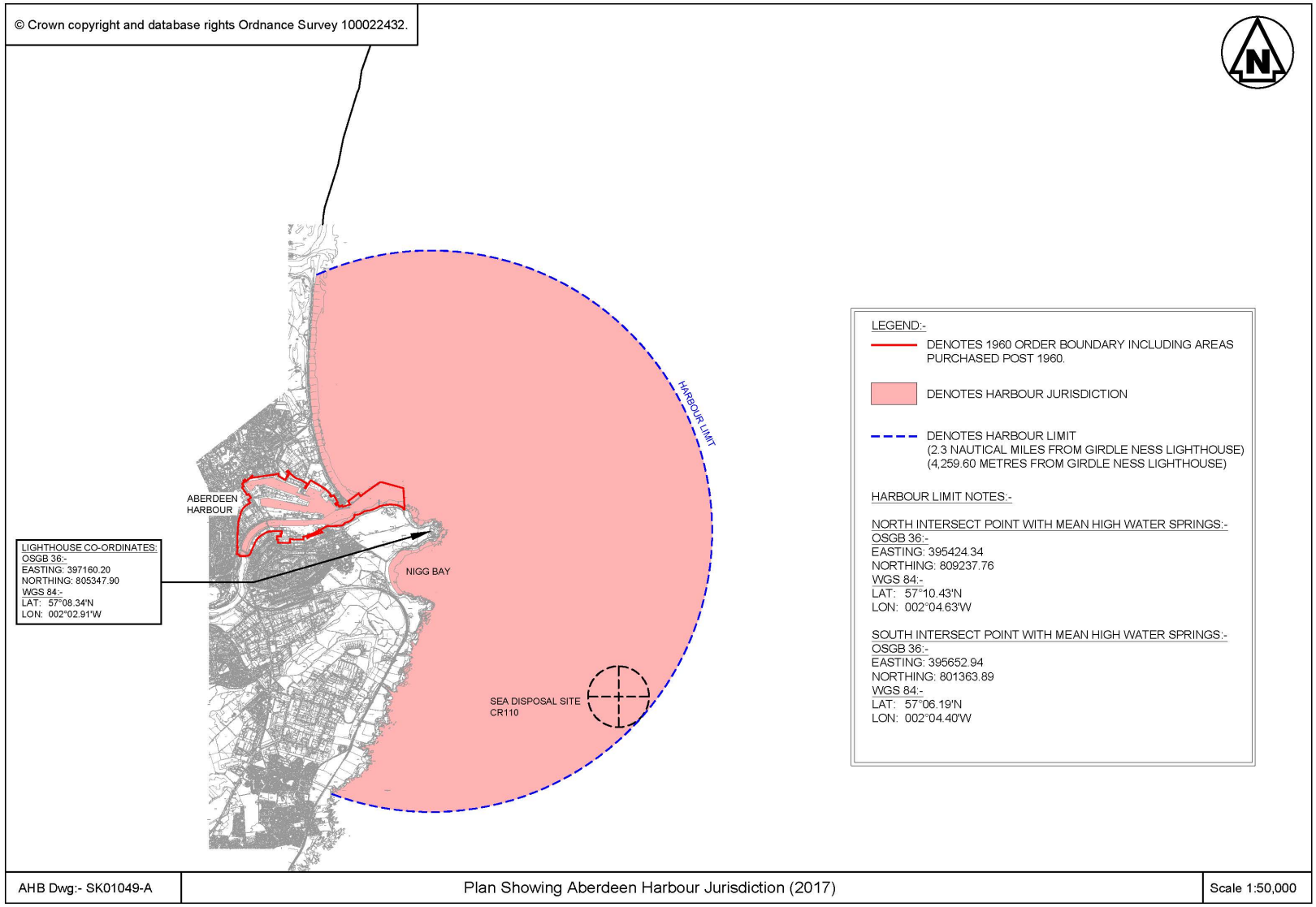


Figure 2 Offshore deposit site Aberdeen CR110

Dredge Area:	Name of Area to be Dredged:	Co-ordinates: Latitude / Longitude: (WGS-84)	Co-ordinates: Easting / Northing: (Ordnance Survey)	Nature of Dredge Area:	Date Area Last Dredged:	Estimated Quantity for Disposal per Year (in-situ m³ / metric tonnes):
A	Navigation Channel	57°08.992N / 002°03.399W	396672.20 / 806557.60	Approach Channel	April 2017	93,000m³ / 139,500t (1.5t per m³)
		57°08.736N / 002°03.273W	396798.80 / 806082.60			
		57°08.362N / 002°04.403W	395658.23 / 805388.99			
		57°08.440N / 002°04.540W	395520.00 / 805534.00			
		57°08.514N / 002°04.358W	395704.20 / 805670.30			
		57°08.509N / 002°04.348W	395713.40 / 805661.20			
		57°08.512N / 002°04.181W	395881.82 / 805667.16			
		57°08.637N / 002°03.823W	396243.11 / 805899.52			
		57°08.728N / 002°03.625W	396443.01 / 806067.29			
B	River Dee	57°08.449N / 002°04.556W	395503.81 / 805550.99	River Dee	April 2017	35,000m³ / 45,500t (1.3t per m³)
		57°08.362N / 002°04.403W	395658.23 / 805388.99			
		57°08.362N / 002°05.352W	394701.29 / 805388.99			
		57°08.449N / 002°05.397W	394655.48 / 805550.99			
C	Tidal Harbour / Telford Dock / Victoria Dock / Upper Dock / Albert Basin	57°08.536N / 002°04.323W	395739.65 / 805711.77	Harbour Berths and Approaches	April 2017	85,000m³ / 110,500t (1.3t per m³)
		57°08.514N / 002°04.358W	395704.20 / 805670.30			
		57°08.440N / 002°04.540W	395520.00 / 805534.00			
		57°08.449N / 002°04.556W	395503.81 / 805550.99			
		57°08.471N / 002°04.546W	395514.42 / 805591.09			
		57°08.486N / 002°04.873W	395183.83 / 805619.08			
		57°08.538N / 002°05.486W	394566.39 / 805716.45			
		57°08.614N / 002°05.506W	394546.27 / 805857.54			
		57°08.623N / 002°05.379W	394674.21 / 805875.39			
		57°08.555N / 002°04.776W	395281.92 / 805746.78			
		57°08.575N / 002°04.767W	395291.49 / 805784.03			
		57°08.608N / 002°04.953W	395103.75 / 805846.24			
		57°08.621N / 002°04.945W	395111.79 / 805870.52			
		57°08.711N / 002°05.426W	394627.12 / 806037.20			
		57°08.654N / 002°05.641W	394410.05 / 805931.86			
		57°08.726N / 002°05.729W	394321.94 / 806066.94			
		57°08.762N / 002°05.634W	394417.81 / 806133.55			
		57°08.792N / 002°05.242W	394812.54 / 806188.42			
		57°08.774N / 002°05.237W	394817.85 / 806154.25			
		57°08.699N / 002°04.871W	395186.62 / 806014.67			
		57°08.661N / 002°04.898W	395159.35 / 805944.16			
		57°08.646N / 002°04.825W	395233.32 / 805917.09			
		57°08.714N / 002°04.756W	395302.72 / 806042.87			
		57°08.675N / 002°04.593W	395467.27 / 805970.44			
		57°08.703N / 002°04.534W	395526.80 / 806021.41			
		57°08.670N / 002°04.482W	395578.57 / 805960.84			
		57°08.650N / 002°04.526W	395534.89 / 805922.74			
				Estimated Total Quantity for Disposal per Year:		213,000m³ / 295,500t

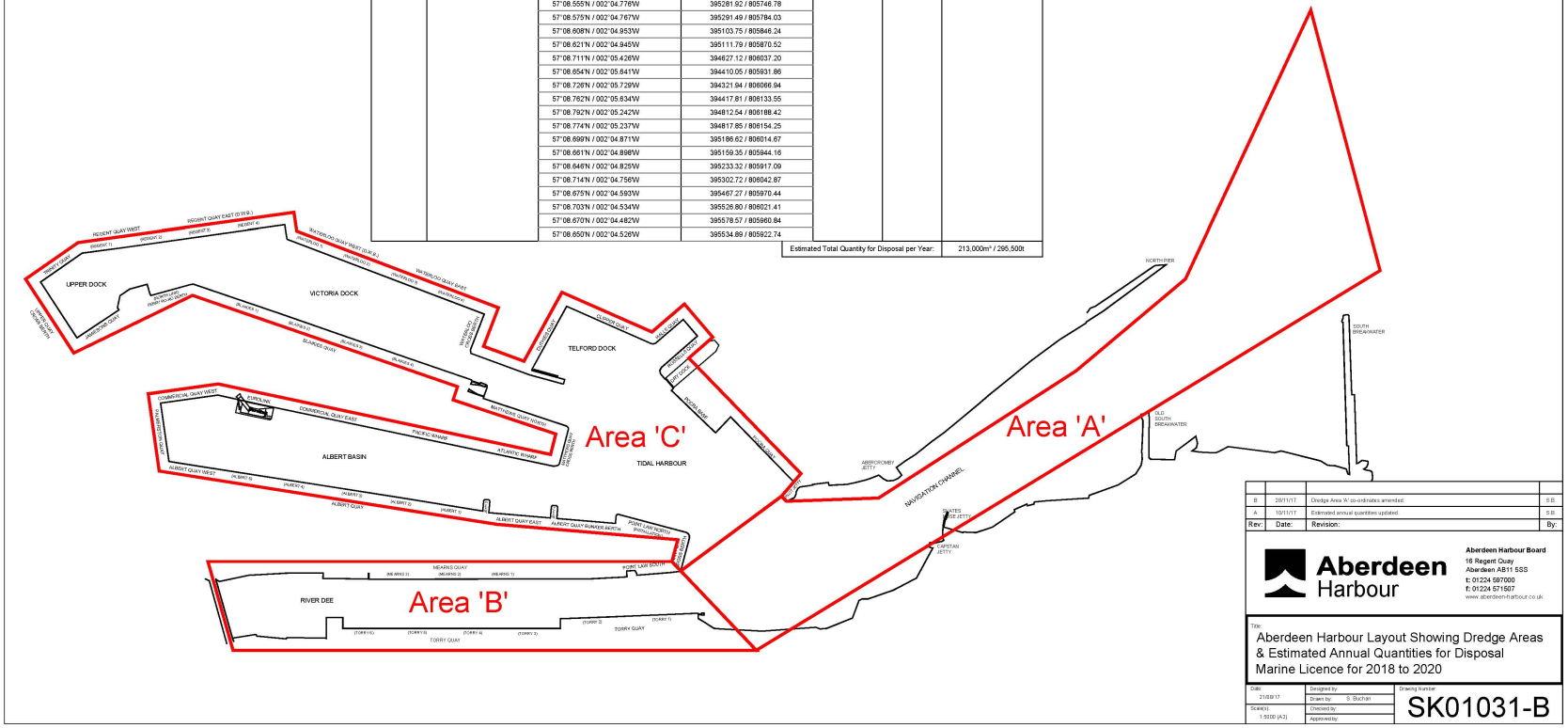


Figure 3 Areas to be dredged

To set these results into context, Marine Scotland has undertaken regular analysis of the material from the dredge hopper during AHB's maintenance dredging campaigns as far back as 1988, and the results of the analysis are provided in Appendix 3. The levels of heavy metals range between below the detection limit to above Revised Action Level 2. For example, a set of samples collected in 1998 and 1999 show elevated levels of copper, zinc, nickel and cadmium above Action Levels 1 and 2, and there are notable samples that are far in excess of Action Level 2. [The licensing regime for dredging and deposit activities has changed substantially since these samples were taken.]

A report by the Marine Laboratory (Hayes *et al*., 2005) examined the concentration of heavy metals at the Aberdeen offshore deposit site CR110, along with other deposit sites off the east coast of Scotland. The majority of samples were collected from surveys undertaken in 2002 and 2003; however, historical data collected and analysed in a similar manner was also included. Table 1 presents the average and maximum concentrations of heavy metals at Aberdeen CR110.

In addition to the Hayes *et al*. study (2005), additional sampling was undertaken by Marine Scotland at Aberdeen CR110 between 1995 and 2011: the results are presented in Appendix 4, and the average concentrations of heavy metals are presented in Table 2. The results from this dataset and the study by Hayes *et al*. (2005) show that levels of heavy metals at the deposit site are consistently below Action Level 1, even during times when material above Action Level 1 (and in some cases above Action Level 2) was deposited at the site. As the average levels are considerably lower in the sediments at the deposit site than at the source of dredging, there is no evidence of an accumulation of heavy metals at the deposit site at levels that could cause biological harm. As such, the current practice of depositing material at the offshore site that is either below Action Level 1, or between Action Level 1 and 2, is considered to have a negligible effect on water quality or biological receptors.

Table 1 Concentrations of heavy metals at Aberdeen offshore deposit site (~2003)

Metal	**Average (mg/kg dry weight)**	**Maximum (mg/kg dry weight)**
Arsenic	6.1	14.0
Cadmium	0	0.2
Chromium	13.1	32.5
Copper	7.9	34.9
Mercury	0.1	0.3
Nickel	7.8	21.2
Lead	13.6	28.5
Zinc	35.9	75.8

(Reproduced from Hayes et al. (2005))

Table 2 Average concentration of heavy metals at Aberdeen offshore deposit site (1995 – 2011)

Metal	Average concentration (mg/kg dry weight)
Arsenic	5.65
Cadmium	0.07
Chromium	12.78
Copper	6.17
Mercury	0.07
Nickel	7.19
Lead	10.93
Zinc	35.95

3. SCOPING OF POTENTIAL OPTIONS

3.1. Introduction

This section describes potential options for the dredged material. When an option is not considered feasible, the reason is given and it is not taken forward to the assessment stage. Those options which are considered to be practicable are considered in Section 4 of this report.

3.2. Option 1: Landfill

The most common use of dredged material within landfill sites is as capping or restoration material. Material would need to be brought ashore within the existing harbour and dewatered before being transported to trucks and taken to the landfill site by road.

There are no suitable sites in the immediate vicinity of the harbour that could cope with a large quantity of material on an annual basis. The closest operational landfill site to Aberdeen Harbour is Loch Hills Quarry in Dyce, approximately 12 km to the north by road from Aberdeen Harbour (SEPA, 2021). Existing landfill sites must cope with large volumes of domestic and industrial requirements, and marine dredgings on the present scale would place an intolerable burden on such sites. Dredged material is relatively inert by landfill standards, so disposal at a landfill site is not usually necessary or recommended unless it is significantly contaminated, which it is not in this case (see Section 2.2).

Dredged material would have to be dried in lagoons before being transported by road to the landfill site. Suitable land for drying lagoons is not available within the harbour estate.

Transportation of material from the harbour to the landfill would generate significant vehicle movements on local roads, contributing to congestion and air and noise pollution, as well as potential road safety concerns.

On these grounds this option has been discounted.

3.3. Option 2: Agriculture Use

The North East of Scotland is a rural farming area with an abundance of good arable land and there is no known requirement for a supplement of imported material. The dredged material would have to be de-watered and desalinated to make it suitable for soil conditioning or spreading, and no land is available to locate a drying lagoon. This option has been discounted.

3.4. Option 3: Use in Land Reclamation

Dredged material can be suitable for land reclamation. The material grade and quality are critical: material suitable for reclamation is generally medium to coarse sands and gravel fractions, typically in large volumes. As the material to be dredged is variable and cannot easily be dredged according to material type, use in reclamation projects is not likely to be appropriate.

Furthermore, no land reclamation projects have been identified within Aberdeen or the local vicinity which require dredged material for land reclamation purposes. This option is therefore discounted for the 2022 marine licence application; however, the sand and gravels dredged from the navigation channel may be suitable for future land reclamation projects should there be a local need that aligns with the timescale required for maintenance dredging.

3.5. Option 4: Beach Recharge

The use of dredged material for beach recharge is a sustainable beneficial use: it generates a purpose for the material that benefits a local amenity. Material is typically deposited direct from the dredging vessel via a pipeline or by ‘rainbowing’ onto the beach, where it is reprofiled using land-based plant. This option is considered further in Section 4.

3.6. Option 5: Use as a Construction Material

The saline content of the dredged material makes it unsuitable as a construction material. The grading and washing required coupled with the drying and storage challenges previously identified makes this option uneconomical and unpractical. This option has been discounted.

3.7. Option 6: Deposition at Sea

The present sea deposit site for dredged material originating from Aberdeen Harbour (CR110 - shown on Figure 2) is approximately 20 minutes’ sailing time from the harbour. It is a long-established deposit site.

The nature of the dredged material and the proximity of a suitable licensed site makes deposition at sea a viable option, which will be considered in detail in Section 4.

3.8. Summary of options scoping

The identification of available options concludes that Options 1 (landfill), 2 (agricultural use), 3 (reclamation) and 5 (construction material) are not viable for the reasons described above. The following options will be taken forward to assessment:

- Beach Recharge
- Deposition at Sea

4. ASSESSMENT OF OPTIONS

In this section, beach recharge and deposition at sea are considered in greater detail.

MS-LOT's general licensing guidance (MS-LOT, 2015) states the following in relation to BPEO assessment: '*consideration must be given to the availability of practical alternatives when considering any applications involving disposal of material at sea. In order for MS-LOT to assess the available alternative options, all sea disposal licence applications must be supported by a detailed assessment of the alternative options. This should include a statement setting out the reasons, including financial, that have led to the conclusion that deposit of the materials at sea is the BPEO*.'

There is no formal guidance available in Scotland on BPEO assessment for disposal of dredged material. This BPEO adopts an approach that considers three aspects: strategic, environmental and financial.

4.1. Beach Recharge

4.1.1. Strategic Considerations

<u>Operational Aspects</u>

Beach recharge (sometimes called beach nourishment) requires clean, sandy material. Such material is typically found in the outer part of the Aberdeen Harbour entrance channel; the remaining mixed silty material from the berths is unlikely to be acceptable (see Appendix 5 showing areas of sand and mixed clays/silts/sands). As an illustration, a computation based on the 2020 post-dredge bathymetric survey versus the pre-dredge survey revealed that approximately 10,900 m^3 of the 54,400 m^3 dredged was likely to be sandy material. For this BPEO, the proportion of material that is potentially suitable for beach recharge is estimated at 20%, but this will vary annually.

The material is typically dredged using a trailer suction hopper dredger. However, since the material has to be deposited on an exposed open beach, this type of dredger could not sail close to the beach and strong pipelines through the breaker zone would be required to deposit sand on the beach. Once ashore, the material would typically be stockpiled in a bund and recovered and spread during low water.

<u>Availability of Suitable Sites</u>

AHB contacts Aberdeen City Council (ACC) and Aberdeenshire Council annually to enquire whether there are any opportunities for using dredged material for beach recharge or other projects. Aberdeenshire Council has no plans for beach recharge works (see

correspondence in Appendix 6). ACC is currently undertaking studies into coastal management solutions at Aberdeen Beach, but there is no definite project at this time, so any requirement for material will not be within the duration of the proposed marine licence (2022). AHB will continue to liaise with ACC and Aberdeenshire Council, and if a project materialises that could make use of the dredged material, it will be considered in a future revision of this BPEO.

General Public Acceptability

The pipework and bunds required to pump the dredged material ashore would create a temporary barrier along the beach. This would prevent the public from accessing parts of the beach in the spring when the dredging and beach recharge would take place. This is likely to be manageable through a communications plan.

Legislative Implications

Standing advice from the Scottish Environment Protection Agency (SEPA) states that waste material, which includes dredged material, deposited above the low water mark is subject to Waste Management Licensing controls regulated by SEPA unless it is subject to a licence issued under Part 4 of the Marine (Scotland) Act 2010, in which case it is excluded from such controls (SEPA, 2017), provided that it does not constitute a landfill (which is not applicable to this project). As beach recharge would require a marine licence, it is assumed that a separate Waste Management Licence would not be required.

Section 34 of the Environmental Protection Act 1990 (as amended) makes it a duty to take all measures available as are reasonable in the circumstances to apply the waste hierarchy set out in Article 4(1) of the Waste Directive. The waste hierarchy ranks waste management options according to the best environmental outcome taking into consideration the lifecycle of the material. In its simplest form, the waste hierarchy gives top priority to preventing waste. When waste is created, it gives priority to reuse, then recycling, then other recovery, and last of all disposal. The option to reuse the material for beach recharge ranks highly on the waste hierarchy; it negates the need to otherwise dispose of the material.

Dredged material to be used for beach recharge requires a licence from the Crown Estate Scotland, and a royalty is payable for use of the material.

4.1.2. Environmental Considerations

Safety Implications

The use of a floating pipeline would present a potential hazard to navigation which will require marking and lighting in accordance with standard industry practice.

Pumping material onto the beach and subsequent reprofiling may present a hazard to beach users. It would be necessary to cordon off areas of the beach during the recharge operation.

Public Health Implications

There is no public health risk given that the dredged material would be naturally occurring sand that is suitable for deposition at sea (see Section 2.2).

Pollution/Contamination

There would be little or no risk of pollution or contamination resulting from the inert material.

Amenity/Aesthetic Implications

The beach provides a valuable local amenity. As described above, it will be necessary to cordon off areas of the beach during the recharge operation. This is unlikely to be a significant concern due to the short term nature of the operation and the wider perceived benefit to beach users of recharging an eroding beach.

4.1.3. Cost considerations

Estimated annual costs of dredging 100,000 m^3 of sand, of which 20,000 m^3 is used for beach recharge:

Lag Pipeline	£400,000
Dismantle Pipeline	£100,000
Hire of Plant	£ 50,000
Pumping Costs @ £1/m^3	£ 20,000
Dredger Mobilisation	£ 50,000
Dredge Costs @ £2.50/m^3	£250,000
TOTAL	£870,000

4.2. Deposition at Sea

Dredging and deposition at sea has been carried out at Aberdeen Harbour throughout its history. For the past 80 years at least, the material has been deposited at the same offshore site used solely by the harbour: Aberdeen CR110, as shown on Figure 2.

4.2.1. Strategic considerations

Operational Aspects

The practicalities of depositing dredged material at the designated Aberdeen CR110 site are straightforward: it is likely that a split hopper barge would be used, which would discharge directly at the deposit site. No preparation of the material is required prior to deposition.

Availability of Suitable Sites/Facility

The licensed deposit site Aberdeen CR110 is available for the acceptance of dredged material and has been used for many years by the harbour.

General Public Acceptability

The deposit site has a long history of use for dredged material. As there is no requirement for the dredged material to come ashore for onward transportation, there is no associated impact on the local road network.

Local Acceptability

There are no anticipated local acceptability issues associated with the continuation of a long-standing method of disposing of dredged material. AHB has never received a complaint or enquiry from a member of the public regarding the deposition of maintenance dredged material at sea. AHB is unaware of any objections received by MS-LOT from members of the public relating to previous marine licence applications.

Legislative Implications

Clause 72 of the Aberdeen Harbour Order (Confirmation) Act 1960 gives AHB powers to dredge provided that the activity is approved by the Scottish Ministers before it is carried on. A marine licence is required from Marine Scotland to deposit material at the offshore site.

The option to deposit the material at an offshore site ranks poorly on the waste hierarchy (see Section 4.1.1 for details).

4.2.2. Environmental considerations

Safety Implications

Deposition at sea would have negligible implications for safety providing that standard navigational and maritime procedures are observed.

Public Health Implications

There are no known threats to public health associated with deposition at sea.

Pollution/Contamination Implications

As presented in Section 2.2, the material to be dredged contains isolated elevations above Marine Scotland Revised Action Level 1 for heavy metals and PAHs, but not to an extent that would prevent deposition of the material in the marine environment. The risk of pollution/contamination is very low.

Interference with other Legitimate Activities

The Aberdeen deposit site is located in open water outwith shipping channels. There is the potential for interference between the dredging vessel and other users of the sea (e.g. fishing vessels), which can be managed through compliance with harbour byelaws and standard communications between the dredging crew, AHB and other users.

Amenity/Aesthetic Implications

There are no amenity or aesthetic implications of depositing material at a designated offshore site.

Ecological Implications

Deposition at sea can smother marine life on the seabed within the site. As the site has been in use for many years and is subject to annual deposition of material, it is likely that any

benthic species in or around the site can tolerate the periodic disturbance caused by deposition and temporary increased turbidity.

A dedicated Marine Mammal Observer (MMO) watch is kept by a nominated crew member, following the general guidance for and acting in the role of a MMO, on the dredging vessel to ensure that marine mammals are not in the vicinity when deposition takes place.

4.2.3. Cost Considerations

Estimated cost of sea deposit of 100,000m^3

Dredger Mobilisation	£50,000
Dredger Costs @ £2.50/m^3	£250,000
TOTAL	£300,000

5. BEST PRACTICABLE ENVIRONMENTAL OPTION

Two potential options are considered in the assessment: beach recharge and deposition at sea.

Operationally, both options are technically practicable. A licensed offshore deposit site (Aberdeen CR110) is available for use. At the time of writing, there are no suitable beach recharge projects that could make use of the dredged material during 2022.

Environmentally, beach recharge is the preferred option according to the waste hierarchy as it uses a material that would otherwise be disposed. Neither option would be likely to cause significant safety, public health, amenity or pollution/contamination issues.

Financially, the estimated cost of beach recharge is almost three times greater than deposition at sea.

Considering all three aspects, deposition of material at sea at Aberdeen CR110 is considered to be the BPEO.

ACC is currently undertaking studies into coastal management solutions at Aberdeen Beach, but there is no definite project at this time, so any requirement for dredged material will not be within the duration of the proposed marine licence (2022). If such a project materialises it will be considered in a future revision of this BPEO.

6. REFERENCES

Hayes, P., Russell, M. & Packer, G. (2005) Surveys of dredged material and wastewater sludge sea disposal sites for the east coast of Scotland. Fisheries Research Services Internal Report No. 08/05.

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Appendices

Appendix 1
Extract from HR Wallingford Siltation Study (1986)

Appendix II

Hydraulics Research
Wallingford

ABERDEEN HARBOUR
An Investigation of Wave Effects
in the Harbour Entrance

Report No EX 1475
August 1986

Registered Office: Hydraulics Research Limited.
Wallingford, Oxfordshire OX10 8BA.
Telephone: 0491 35381. Telex: 848552

Extract from Report (Ex 1475)

Summary and Recommendations

This preliminary study has investigated the siltation of the navigation channel at Aberdeen, in particular reviewing the link between infill and wave action. Analysis was based on the recorded changes of a single cross-section, because of the time and cost restraints of the study, but it is felt that the observed behaviour of that section gives a good indication of the channel infill as a whole.

Apart from some infill soon after maintenance dredging, which is tentatively attributed to slumping of the channel side-slopes, the majority of siltation seems to travel into the channel from the north. In addition, periods of rapid infill appear to be strongly linked with heavy wave activity.

However, the siltation of the channel cannot be explained by wave effects alone. Calculations of along shore drift for the beaches north of the harbour indicate a strong sediment transport from south to north, and this is confirmed both by the spit and the mouth of the Rive Don, and the reported build-up of material on the southern side of groynes along this frontage. This direction of sediment transport therefore opposes the observed direction causing infill in the channel.

Although this may be partially explained by a long-term onshore movement of sand from deep water, a more satisfactory explanation involves the tidal currents.

Because of the generally southward set of the tidal currents from about 4¾ hours before to 1¼ hours after high-water, it seems likely that sand on the sea bed is stirred during heavy wave action by the oscillating currents, and then advected into the harbour entrance by the admittedly rather weak tidal currents. Once reaching the channel, the material is deposited in the area sheltered by the breakwaters. On the ebb tide, when at lower water levels this shelter is increased, the wave action cannot stir the sediment quite so vigorously. In addition, the ebb current has to flow up the channel side-slope (near the sea bed) and is therefore less able to flush material out of the channel entrance. This wave-stirring/tidal advection process will occur whatever the wave direction, and will also produce the observed infill pattern in the channel.

In addition to this combined tidal current/wave action mechanism, there is also the infill due to wave action alone when the wind direction is from north of east. Although these conditions occur much more infrequently than waves from the south-east sector, they will be much more efficient, hour for hour, in causing channel infill.

Appendix 2
Sediment sampling results 2020

Applicant Information

Applicant:	Aberdeen Harbour Board
Description of dredging:	Maintenance dredging within Aberdeen Harbour
Total amount to be dredged (wet tonnes)	295500

Sample Details & Physical Properties

Explanatory Notes:
An example of a 'Dredge area' is: 'Dock A, Harbour X'
Provide description of the dredge area and the latitude and longitude co-oridnates (WGS84) for each sample location. Co-ordinates taken from GPS equipment should be set to WGS84.
Note for sample depth that the seabed is 0 metres.
Gravel is defined as >2mm, **Sand** is defined as >63um<2mm, **Silt** is deinfed as <63um).

Sample information:

Sample ID	Dredge area	Latitude	Longitude	Type of sample	Sample depth (m)	Total solids (%)	Gravel (%)	Sand (%)	Silt (%)	TOC (%)	Specific gravity	Asbestos
MAR00796.00	1-Channel Outer 8.0m	57°08.767'N	002°03.587'W		0	67.4	0	98.3	1.7	0.16	2.72	No
MAR00796.00	2-Channel Outer 8.0m	57°08.699'N	002°03.670'W		0	56.3	0	46.9	53.1	1.17	2.66	No
MAR00796.00	3-Channel Mid 7.0m	57°08.587'N	002°03.842'W		0	60.6	0	44.5	55.5	1.26	2.71	No
MAR00796.00	4-Channel Inner 6.0m	57°08.427'N	002°04.316'W		0	39.3	2.6	45.9	51.5	3.25	2.6	No
MAR00796.00	5-Pocra 6.0m	57°08.571'N	002°04.488'W		0	35	0	41.1	58.9	4.97	2.95	No
MAR00796.00	6-Telford Pit 11.0m	57°08.641'N	002°04.744'W		0	46.4	0	34.1	65.9	2.3	2.62	No
MAR00796.00	7-Waterloo 9.3m	57°08.749'N	002°05.253'W		0	33.5	0	22.7	77.3	2.83	2.58	No
MAR00796.00	8-Palmerston 6.0m	57°08.576'N	002°05.418'W		0	38.6	0	22.4	77.6	2.85	2.46	No
MAR00796.00	9-Atlantic 8.7m	57°08.547'N	002°04.902'W		0	42.6	0	30.6	69.4	2.59	2.59	No
MAR00796.01	10-River 7.5m	57°08.408'N	002°04.805'W		0	69.7	0.3	90.3	9.4	0.29	2.61	No
		°.'N	°.'W									
		°.'N	°.'W									
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		°.'N	°.'W									
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		°.'N	°.'W									
		°.'N	°.'W									

Trace Metals & Organotins

Explanatory Notes:
Results above Action Level 1 will be highlighted in blue and above Action Level 2 in red.

Sample information:

Sample ID	Dredge area	Type of sample	Sample depth (m)	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Mercury (Hg)	Nickel (Ni)	Lead (Pb)	Zinc (Zn)	Dibutyltin (DBT)	Tributyltin (TBT)
				mg/kg dry weight									
MAR00796.00	1-Channel Outer 8.0m	0	0	6.2	<0.04	25.1	4.8	0.01	13.6	6.9	24.7	<0.005	<0.005
MAR00796.00	2-Channel Outer 8.0m	0	0	5.7	0.17	21.7	9.7	0.03	14.4	10.2	41.8	<0.005	<0.005
MAR00796.00	3-Channel Mid 7.0m	0	0	6.2	0.17	21	10	0.02	13.9	10.7	38.6	<0.005	<0.005
MAR00796.00	4-Channel Inner 6.0m	0	0	7	0.25	27	16.4	0.04	18.1	15.7	55.9	<0.005	<0.005
MAR00796.00	5-Pocra 6.0m	0	0	9.4	0.25	35.6	26.5	0.05	23	20.2	71.7	<0.005	<0.005
MAR00796.00	6-Telford Pit 11.0m	0	0	8.1	0.31	29.1	38.8	0.05	18.8	18.4	67.5	0.0131	<0.005
MAR00796.00	7-Waterloo 9.3m	0	0	9.6	0.46	31.8	71	0.08	20	23.8	94.6	<0.005	<0.005
MAR00796.00	8-Palmerston 6.0m	0	0	8.4	0.38	34.6	50.6	0.06	21.8	18.9	88.7	<0.005	<0.005
MAR00796.00	9-Atlantic 8.7m	0	0	7.7	0.26	32.2	30.5	0.04	20.8	16.7	65.1	<0.005	<0.005
MAR00796.01	10-River 7.5m	0	0	7.6	0.36	70.7	34.3	0.2	48.8	35.3	86.6	<0.005	<0.005
0	0	0	0										
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Polyaromatic Hydrocarbons (PAH)

Explanatory Notes:
Results above Action Level 1 will be highlighted in blue and above Action Level 2 in red.

Definitions:

ACENAPTH	Acenaphthene
ACENAPHY	Acenaphthylene
ANTHRACN	Anthracene
BAA	Benz(a)anthracene
BAP	Benzo(a)pyrene
BBF	Benzo(b)fluoranthene
BEP	Benzo(e)pyrene
BENZGHIP	Benzo(ghi)perylene
BKF	Benzo(K)fluoranthene
C1N	C1-naphthalenes
C1PHEN	C1-phenanthrene
C2N	C2-naphthalenes
C3N	C3-naphthalenes
CHRYSENE	Chrysene
DBENZAH	Diben(ah)anthracene
FLUORANT	Fluoranthene
FLUORENE	Fluorene
INDPYR	Indeno(1,2,3-cd)pyrene
NAPTH	Naphthalene
PERYLENE	Perylene
PHENANT	Phenanthrene
PYRENE	Pyrene
THC	Total Hydrocarbon Content

Sample information:

Sample ID	Dredge area	Type of sample	Sample depth (m)	μg/kg																						
				ACENAPTH	ACENAPHY	ANTHRACN	BAA	BAP	BBF	BEP	BENZGHIP	BKF	C1N	C1PHEN	C2N	C3N	CHRYSENE	DBENZAH	FLUORANT	FLUORENE	INDPYR	NAPTH	PERYLENE	PHENANT	PYRENE	THC
MAR00796.001	1-Channel Outer 8.0m	0	0	<1	<1	<1	2.44	2.57	2.19	1.84	1.76	1.16	<1	<1	<1	<1	2.21	<1	2.86	<1	2.06	<1	<1	<1	2.96	20800
MAR00796.002	2-Channel Outer 8.0m	0	0	10.2	8.64	28.2	73.3	79.3	73.7	62.7	57.6	27.6	30	67.1	29.2	31.5	75	11.7	149	13.8	62	13.5	33.3	105	142	86700
MAR00796.003	3-Channel Mid 7.0m	0	0	8.72	6.18	18.7	48.3	54	54.6	44.5	42.6	27.2	26.5	51	27.2	28.8	50.5	7.21	91.1	8.87	46.9	11.4	25.8	64	89.2	35100
MAR00796.004	4-Channel Inner 6.0m	0	0	15.1	13.6	20.4	69.2	92.2	101	82.2	78.3	52.9	60.3	59.8	63.3	49.2	68.3	19.2	114	16.3	90.3	26.3	45.2	88.5	107	187000
MAR00796.005	5-Pocra 6.0m	0	0	6.43	13.1	25.5	87.9	104	98.4	86.3	87.3	54.5	41.4	73	44.1	38.6	78.1	16.7	161	11.7	89.5	17.1	49.6	76.3	163	310000
MAR00796.006	6-Telford Pit 11.0m	0	0	13	12.5	34.2	93.1	113	117	97.1	96.2	64.6	55.5	100	60.1	74.5	93.2	19.1	164	17.4	102	20.9	126	99.2	175	331000
MAR00796.007	7-Waterloo 9.3m	0	0	22.2	13.3	45.3	126	142	152	130	129	69.5	59.6	132	73.1	56.6	141	25	245	19.6	130	25.6	81.2	166	261	462000
MAR00796.008	8-Palmerston 6.0m	0	0	13.8	11.4	31	92.4	126	135	111	109	61.5	54.1	97.4	56.6	41.5	106	21	173	14.9	118	23.4	71.1	97	179	290000
MAR00796.009	9-Atlantic 8.7m	0	0	9.55	13.7	29.9	86.8	102	110	92	93.6	52.8	50.2	77.5	52.7	45.6	87.8	17.1	148	15.5	101	21.5	83.6	87.5	150	212000
MAR00796.010	10-River 7.5m	0	0	<1	<1	1.49	3.73	4.87	6.57	5.7	5.22	2.96	3.69	4.37	3.58	2.5	4.77	1.08	7.87	1.28	5.09	1.49	3.22	6.44	8.4	28500
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Organohalogens

Explanatory Notes:
Results above Action Level 1 will be highlighted in blue and above Action Level 2 in red.
ICES7 is the sum of PCB 28,52,101,138,153,180 and 118.

Definitions:

AHCH	alpha-Hexachlorcyclohexane
BHCH	beta-Hexachlorcyclohexane
GHCH	gamma-Hexachlorcyclohexane
DIELDRIN	Dieldrin
HCB	Hexachlorobenzene
PPDDE	p,p'-Dichorodiphenyldicloroethylene
PPDDT	p,p'-Dichorodiphenyltrichloroethane
PPTDE	p,p'-Dichorodiphenyldicloroethane

Sample information:

Sample ID	Dredge area	Type of sample	Sample depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB18	PCB105	PCB110	PCB128	PCB141	PCB149
MAR00796.00	1-Channel Outer 8.0m	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08						
MAR00796.00	2-Channel Outer 8.0m	0	0	0.3	0.33	0.23	0.22	0.41	0.32						
MAR00796.00	3-Channel Mid 7.0m	0	0	0.24	0.33	0.17	0.17	0.13	0.15						
MAR00796.00	4-Channel Inner 6.0m	0	0	0.29	0.33	0.24	0.31	0.3	0.27						
MAR00796.00	5-Pocra 6.0m	0	0	0.33	0.39	0.22	0.31	0.38	0.31						
MAR00796.00	6-Telford Pit 11.0m	0	0	0.35	0.43	0.3	0.3	0.38	0.33						
MAR00796.00	7-Waterloo 9.3m	0	0	0.38	0.44	0.29	0.33	0.48	0.35						
MAR00796.00	8-Palmerston 6.0m	0	0	0.44	0.54	0.32	0.39	0.37	0.32						
MAR00796.00	9-Atlantic 8.7m	0	0	0.31	0.32	0.25	0.32	0.31	0.29						
MAR00796.01	10-River 7.5m	0	0	0.08	0.11	<0.08	<0.08	<0.08	<0.08						
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PCB151	PCB156	PCB158	PCB170	PCB180	PCB183	PCB187	PCB194	PCB31	PCB44	PCB47	PCB49	PCB66	ICES7	AHCH	BHCH	GHCH	DIELDRIN
										µg/kg							
				<0.08									0.56	<0.1	<0.1	<0.1	<0.1
				0.09									1.9	<0.1	<0.1	<0.1	<0.1
				<0.08									1.27	<0.1	<0.1	<0.1	<0.1
				0.1									1.84	<0.1	<0.1	<0.1	0.13
				0.1									2.04	<0.1	<0.1	<0.1	0.1
				<0.08									2.17	<0.1	<0.1	<0.1	<0.1
				0.11									2.38	<0.1	<0.1	<0.1	0.19
				0.12									2.5	<0.1	<0.1	<0.1	0.1
				0.08									1.88	<0.1	<0.1	<0.1	<0.1
				<0.08									0.59	<0.1	<0.1	<0.1	0.15

HCB	DDE	DDT	TDE	BDE100	BDE138	BDE153	BDE154	BDE17	BDE183	BDE209	BDE28	BDE47	BDE66	BDE85	BDE99
<0.1	<0.1	<0.1	<0.1												
<0.1	0.39	<0.1	0.34												
<0.1	0.3	0.15	0.26												
<0.1	0.58	<0.1	0.59												
<0.1	0.67	1.59	0.6												
<0.1	0.51	<0.1	0.53												
<0.1	0.76	<0.1	0.67												
0.13	0.44	0.16	0.46												
<0.1	0.45	<0.1	0.44												
<0.1	<0.1	0.14	0.06												

PR Details

Total amount to be dredged (wet tonnes)	295500

Explanatory Notes:
The values entered for each determinand should be an average wet weight concentration from all the samples representing the material to be disposed to sea. They should be entered in the units stated in the Unit of measurement column in the table below.
Results above Action Level 1 will be highlighted in blue and above Action Level 2 in red.

Average for the total dredge area:

Sample ID	Unit of measurement	
Total Solids	%	48.9
Gravel	%	0.29
Sand	%	47.7
Silt	%	52.03
Arsenic (As)	mg/kg	3.6
Cadmium (Cd)		0.12
Chromium (Cr)		16.9
Copper (Cu)		12.8
Mercury (Hg)		0.03
Nickel (Ni)		11
Lead (Pb)		8.7
Zinc (Zn)		29.8
Dibutyltin (DBT)		0.006
Tributyltin (TBT)		<0.005
Acenapth	µg/kg	4.4
Acenapthylene		4.1
Anthracn		10.2
BAA		29.1
BAP		34.8
BBF		35.9
BEP		30.1
Benzghip		29.4
BKF		17.4
C1N		16.3
C1PHEN		28.3
C2N		17.3
C3N		16
Chrysene		30.1
Debenzah		5.9
Flurant		53.5
Fluorene		5.26
Indypr		31.5
napth		6.93
perylene		22.1
phenant		34.1
pyrene		54.3
THC		79700
PCB28		0.12
PCB52		0.15
PCB101		0.1
PCB118		0.11
PCB138		0.13
PCB153		0.11
PCB18		
PCB105		
PCB110		
PCB128		
PCB141		
PCB149		
PCB151		
PCB156		
PCB158		
PCB170		
PCB180		<0.08
PCB183		
PCB187		
PCB194		
PCB31		
PCB44		
PCB47		
PCB49		
PCB66		
ICES7		0.76
AHCH		<0.1
BHCH		<0.1
GHCH		<0.1
DIELDRIN		<0.1
HCB		<0.1
DDE		0.18
DDT		0.11
TDE		0.17
BDE100		
BDE138		
BDE153		
BDE154		
BDE17		
BDE183		
BDE209		
BDE28		
BDE47		
BDE66		
BDE85		
BDE99		

Comments:

Laboratory Details

Explanatory Notes:
Please complete a separate worksheet for each laboratory (e.g. complete 'Laboartory_1' worksheet for 1 laboratory and complete 'Laboartory_2' worksheet for a second laboratory). If there are more than 3 laboratories then please contact MS-LOT.

Laboratory 1 Details:

Laboratory name:	SOCOTEC
Year:	2020

LabRefMat	**Q1**	Does the laboratory carrying out the analyses undertake the analysis of blank samples and laboratory reference materials with each batch of samples of waste and other material dumped in the maritime area that is analysed by that laboratory?	Yes
CompAnal	**Q2**	Does the laboratory carrying out the analyses undertake periodic comparative analysis of laboratory reference materials and certified reference materials?	Yes
QAQC	**Q3**	Does the laboratory carrying out the analyses undertake the compilation of quality control charts based upon the data resulting from the analyses of the laboratory reference materials and certified reference materials, and the use of those quality control charts to monitor analytical performance in relation to all samples of dumped wastes or other materials?	Yes
InterlabCaleb	**Q4**	Does the laboratory carrying out the analyses undertake periodic participation in interlaboratory comparison exercises, including, where possible, international comparison exercises?	Yes
InternatCaleb	**Q5**	Does the laboratory carrying out the analyses undertake periodic participation in national and, where possible, international laboratory proficiency schemes?	Yes
SpikedSamples	**Q6**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory analyse samples of substances which are provided by the organisers of the scheme?	Yes
BlindSamples	**Q7**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory confirm that the composition of those samples is not disclosed in advance?	Yes
Ranking	**Q8**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory confirm that the results of the scheme for each participating laboratory are made available to all participating laboratories?	Yes
FracAnal	**Q9**	Enter the size fraction that is analysed i.e. Whole or less than 63µm etc.	<63um(metals)
GranMeth	**Q10**	PSA method	NMBAQC
OCMeth	**Q11**	Organic Carbon method	carbonate removal and sulfurous acid/combustion at 800°C/NDIR,
MetExtrType	**Q12**	Method of extraction used for metal analysis	Aquaregia
MethOfDetMetals	**Q13**	Method of detection used for metal analysis	ICP-MS
PAHExtrType	**Q14**	Method of extraction used for poly aromatic hydrocarbon analysis	Methanol/DCM solvent extraction with silica clean up and copper clean up stages
MethOfDetPAH	**Q15**	Method of detection used for poly aromatic hydrocarbons analysis	GCMS
OHExtrType	**Q16**	Method of extraction used for organohalogens inc PCBs, pesticides, flame retardants etc analysis	Ultrasonic acetone/hexane solvent extraction
MethOfDetOH	**Q17**	Method of detection used for organohalogens inc PCBs, pesticides, flame retardants etc analysis	GCMSMS
OTExtrType	**Q18**	Method of extraction used for organotin analysis	derivatisation and solvent extraction
MethOfDetOT	**Q19**	Method of detection used for organotin analysis	GCMS

		LOD/LOQ	Precision (%)	Recovery (%)
mg/kg	Hg	0.01	4.2	102
	As	0.5	2.7	100
	Cd	0.04	3.6	102
	Cu	0.5	2.9	95
	Pb	0.5	3	99
	Zn	2	2.6	99
	Cr	0.5	3.1	96
	Ni	0.5	3.6	97
	TBT	0.001	12.62	72
	DBT	0.001	12.62	82
µg/kg	PCB28	0.08	12.56	101
	PCB31			
	PCB44			
	PCB47			
	PCB49			
	PCB52	0.08	6.999	114
	PCB66			
	PCB101	0.08	8.43	99
	PCB105			
	PCB110			
	PCB118	0.08	14.61	106
	PCB128			
	PCB138+163	0.08	12.93	115
	PCB141			
	PCB149			
	PCB151			
	PCB153	0.08	7.41	101
	PCB156			
	PCB158			
	PCB170			
	PCB180	0.08	9.85	77
	PCB183			
	PCB187			
	PCB194			
	DDE	0.1	8.2	77
	DDT	0.1	10.6	107
	DDD	0.1	11	89
	Dieldrin	0.1	10.8	94
	Lindane	0.1	8.5	113
	HCB	0.1	2.8	87
	BDE17			
	BDE28			
	BDE47			
	BDE66			
	BDE85			
	BDE99			
	BDE100			
	BDE138			
	BDE153			
	BDE154			
	BDE183			
	BDE209			
	ACENAPTH	1	6.68	110
	ACENAPHY	1	7.74	110
	ANTHRACN	1	4.95	110
	BAA	1	9.8	85
	BAP	1	9.07	89
	BBF	1	8.44	84
	BENZGHIP	1	13.46	87
	BEP	1	7.9	81
	BKF	1	8.9	90
	C1N	1	8.27	99
	C1PHEN	1	N/A	90
	C2N	1	N/A	100
	C3N	1	N/A	84
	CHRYSENE	1	7.87	94
	DBENZAH	1	19.23	89
	FLUORENE	1	5.25	100
	FLUORANT	1	4.36	91
	INDPYR	1	17.1	80
	NAPTH	1	3.02	84
	PERYLENE	1	N/A	82
	PHENANT	1	5.41	99
	PYRENE	1	4.29	90
	THC	100	N/A	112

Appendix 3
Marine Scotland sediment sampling analysis of maintenance dredged material from Aberdeen Harbour (1988 – 2012)

Marine Scotland sampling: Aberdeen Harbour maintenance dredging heavy metal results 1988 - 2012

NA = Not Analysed; ND = Not Detected; BDL = Below Detection Limit **Location I**	**Location II**	**LIMS/UKAS No.**	**Lab Sample No.**	**Latitude**	**Longitude**	**Oslo Dump**	**Year**	**As mg/g**	**Cd mg/g**	**Cr mg/g**	**Cu mg/g**	**Hg mg/g**	**Ni mg/g**	**Pb mg/g**	**Zn mg/g**
Aberdeen						CR110	1988	4.30	1.540	10.80	4.12	0.010	6.19	26.00	27.30
Aberdeen						CR110	1988	5.73	1.550	6.89	0.50	0.010	2.22	16.90	14.00
Aberdeen						CR110	1988	3.69	1.860	8.24	0.50	0.010	2.66	20.20	16.80
Aberdeen						CR110	1989	4.90	0.200	18.30	6.55	0.060	7.63	17.90	40.20
Aberdeen						CR110	1989	4.58	0.200	17.90	9.03	0.070	8.91	24.30	97.80
Aberdeen						CR110	1989	4.25	0.620	23.10	10.40	0.100	11.60	27.70	57.30
Aberdeen						CR110	1989	4.81	0.200	27.80	10.40	0.090	12.50	32.80	64.50
Aberdeen						CR110	1989	7.09	1.460	15.10	18.20	0.500	16.50	44.00	128.00
Aberdeen						CR110	1989	4.59	0.200	32.40	19.20	0.100	13.50	31.30	99.20
Aberdeen						CR110	1989	5.24	0.200	24.50	21.20	0.100	10.30	28.50	83.90
Aberdeen						CR110	1989	5.94	0.200	13.80	2.45	0.050	4.50	17.30	24.60
Aberdeen						CR110	1989	6.47	0.200	32.30	13.30	0.100	15.40	41.70	89.70
Aberdeen	Albert Quay					CR110	1990	6.24	0.518	36.20	69.70	0.654	28.20	133.00	274.00
Aberdeen	Albert Quay					CR110	1990	4.70	0.713	38.50	67.00	0.377	25.40	139.00	315.00
Aberdeen						CR110	1990	1.39	0.200	47.20	36.00	0.020	37.70	27.70	101.00
Aberdeen						CR110	1990	1.13	0.200	38.90	35.80	0.009	38.00	26.30	104.00
Aberdeen						CR110	1990	5.93	0.200	20.80	39.20	1.010	23.60	978.00	137.00
Aberdeen						CR110	1990	3.13	0.200	15.50	7.29	0.072	11.40	16.60	47.70
Aberdeen						CR110	1990	4.54	0.200	24.20	19.40	0.132	18.20	36.60	89.40
Aberdeen						CR110	1990	2.07	0.200	16.70	8.67	0.078	11.60	16.00	49.40
Aberdeen						CR110	1990	6.89	0.262	22.00	22.60	0.129	18.50	38.90	111.00
Aberdeen						CR110	1990	7.53	0.481	25.00	30.40	0.151	20.20	43.60	127.00
Aberdeen						CR110	1990	7.27	0.737	24.00	48.80	0.220	19.10	51.00	157.00
Aberdeen						CR110	1990	4.72	0.304	19.00	16.30	0.097	14.40	32.60	82.50
Aberdeen	Mearns Quay					CR110	1990	0.34	0.200	10.90	12.60	0.013	12.00	10.00	34.60
Aberdeen	Mearns Quay					CR110	1990	0.48	0.200	7.07	7.90	0.014	6.36	10.70	25.30
Aberdeen	Mearns Quay					CR110	1990	2.28	0.200	12.30	12.70	0.033	8.60	18.30	52.60
Aberdeen	Mearns Quay					CR110	1990	4.96	0.200	20.20	16.30	0.029	5.10	13.00	52.70
Aberdeen	Mearns Quay					CR110	1990	3.11	0.200	19.60	18.60	0.122	16.00	18.90	67.60
Aberdeen	Mearns Quay					CR110	1990	0.92	0.200	9.31	7.30	0.005	7.72	10.70	23.30
Aberdeen	Navigation Channel					CR110	1991	7.51	0.200	19.60	14.40	1.330	20.40	36.90	73.60
Aberdeen	Navigation Channel					CR110	1991	8.81	0.200	20.80	20.50	0.170	20.70	45.70	94.50
Aberdeen	Navigation Channel					CR110	1991	6.07	0.430	16.80	13.50	0.010	17.10	23.80	71.00
Aberdeen						CR110	1991	5.99	0.425	20.00	17.10	0.010	18.70	23.00	87.20
Aberdeen						CR110	1991	7.16	0.200	21.70	9.38	0.010	10.70	21.90	89.80
Aberdeen						CR110	1991	8.93	0.400	21.40	21.60	1.390	18.90	38.50	99.10
Aberdeen						CR110	1991	7.19	0.200	20.50	23.80	1.530	25.70	49.40	104.00
Aberdeen						CR110	1991	5.43	0.330	18.70	19.60	0.010	19.00	36.20	93.80
Aberdeen						CR110	1991	8.81	1.030	23.20	52.10	0.153	24.70	76.90	180.00
Aberdeen						CR110	1991	4.75	0.200	11.70	5.78	0.010	31.00	23.40	36.70
Aberdeen	Albert Quay West					CR110	1992	30.30	1.700	34.00	97.30	0.490	21.80	89.10	505.00
Aberdeen	Albert Quay					CR110	1992	11.30	0.500	21.40	30.30	0.170	13.00	38.50	104.00
Aberdeen	Albert Quay East					CR110	1992	6.19	0.500	19.50	20.00	0.130	15.60	33.50	94.30
Aberdeen	Albert Quay West					CR110	1992	11.50	0.590	27.50	71.70	0.450	20.10	81.40	354.00
Aberdeen	Tug Jetty					CR110	1992	15.20	0.500	21.10	27.00	0.230	15.00	36.50	112.00
Aberdeen	Pontoon No 4					CR110	1992	18.50	0.500	25.90	170.00	0.330	12.90	58.00	327.00
Aberdeen	Pontoon No 4					CR110	1992	21.10	0.860	27.80	187.00	1.010	20.20	97.20	371.00
Aberdeen	Tug Jetty					CR110	1992	8.33	0.500	20.30	29.30	0.360	15.60	36.60	123.00
Aberdeen	Upper Quay					CR110	1992	9.75	0.500	24.80	58.50	0.400	15.50	95.60	248.00
Aberdeen	Trinity Quay					CR110	1992	8.90	0.570	22.20	57.60	0.650	16.10	124.00	275.00
Aberdeen	Entrance Channel					CR110	1992	5.69	0.500	16.70	11.80	0.130	12.20	23.80	67.90
Aberdeen	Entrance Channel					CR110	1992	5.86	0.500	17.80	12.60	0.050	14.40	30.00	78.60
Aberdeen	Approach Channel					CR110	1992	5.66	0.500	20.00	14.20	0.200	15.10	27.60	78.50
Aberdeen	Pacific Wharf					CR110	1992	7.08	0.500	20.00	25.70	0.200	16.00	42.70	110.00
Aberdeen	Atlantic Wharf					CR110	1992	4.36	0.500	21.60	41.50	0.200	18.60	41.50	56.00
Aberdeen	Approach Channel					CR110	1992	5.68	0.500	13.80	6.06	0.130	10.00	14.80	40.20
Aberdeen	Albert Basin					CR110	1992	22.00	0.500	23.10	35.60	0.220	17.80	45.60	137.00

NA = Not Analysed; ND = Not Detected; BDL = Below Detection Limit **Location I**	**Location II**	**LIMS/UKAS No.**	**Lab Sample No.**	**Latitude**	**Longitude**	**Oslo Dump**	**Year**	**As mg/g**	**Cd mg/g**	**Cr mg/g**	**Cu mg/g**	**Hg mg/g**	**Ni mg/g**	**Pb mg/g**	**Zn mg/g**
Aberdeen	Mearns Quay					CR110	1992	15.90	0.500	17.50	19.00	0.100	13.20	43.50	104.00
Aberdeen	Victoria Dock					CR110	1992	25.90	0.500	23.90	40.40	0.350	18.40	66.80	165.00
Aberdeen	Bar					CR110	1992	5.04	0.500	10.80	4.13	0.050	11.40	11.40	32.30
Aberdeen	Atlantic Wharf					CR110	1992	9.00	0.500	15.20	16.60	0.080	13.60	26.60	83.40
Aberdeen	Tidal Basin					CR110	1992	14.80	0.500	19.90	20.60	0.130	15.50	36.20	101.00
Aberdeen	Tidal Basin					CR110	1992	13.30	0.500	19.90	20.30	0.220	15.90	34.80	95.80
Aberdeen	South Bar					CR110	1992	5.08	0.500	13.00	8.13	0.050	10.40	20.50	51.00
Aberdeen	Approach Channel					CR110	1992	5.86	0.500	13.70	14.90	0.100	11.50	26.40	76.10
Aberdeen	Texaco Berth					CR110	1993	8.61	0.200	12.30	16.80	0.060	18.30	38.20	88.90
Aberdeen	Maitland Quay					CR110	1993	6.91	0.200	12.40	22.50	0.100	14.40	55.40	154.00
Aberdeen	Mearns Quay					CR110	1993	8.87	0.200	17.20	15.70	0.100	17.90	51.70	86.30
Aberdeen	Total Quay					CR110	1993	7.98	0.200	12.00	19.50	0.080	18.50	37.00	103.00
Aberdeen	Hall Russell Quay					CR110	1993	10.10	0.200	19.50	45.00	0.530	19.60	110.00	151.00
Aberdeen	Hall Russell Quay					CR110	1993	8.14	0.200	19.80	29.70	0.290	17.20	59.30	121.00
Aberdeen	Hall Russell Quay					CR110	1993	4.04	0.200	6.09	16.70	0.120	5.65	34.60	37.40
Aberdeen	15m North of Jetty					CR110	1993	8.19	0.200	18.10	41.90	0.550	19.40	101.00	129.00
Aberdeen	Off Duthies Quay					CR110	1993	9.73	0.900	21.80	31.30	0.870	20.70	74.60	131.00
Aberdeen						CR110	1993	4.19	0.200	15.90	10.00	0.350	18.80	21.20	53.30
Aberdeen						CR110	1993	6.02	0.200	7.52	34.00	0.300	10.70	80.60	75.20
Aberdeen						CR110	1993	4.62	0.200	1.44	23.10	0.050	4.81	48.30	57.70
Aberdeen	Turning Basin					CR110	1994	56.10	0.300	17.50	32.70	0.194	19.70	58.20	113.00
Aberdeen	Turning Basin					CR110	1994	47.10	0.050	16.20	21.40	0.124	18.60	39.00	89.30
Aberdeen	Turning Basin					CR110	1994	4.92	0.350	20.20	29.50	0.295	21.50	51.80	112.00
Aberdeen	Navigation Channel					CR110	1994	3.71	0.050	11.10	23.90	0.046	10.90	18.10	49.70
Aberdeen	Navigation Channel					CR110	1994	3.45	0.050	11.30	11.00	0.082	14.50	20.80	58.70
Aberdeen	LN 45					CR110	1994	5.22	0.300	18.90	43.00	0.356	22.00	83.80	129.00
Aberdeen	LN 57					CR110	1994	2.64	0.050	12.90	15.80	0.110	15.80	29.80	78.70
Aberdeen	Navigation Channel					CR110	1994	3.41	0.050	10.10	9.02	0.043	2.64	18.90	53.40
Aberdeen	LN 46					CR110	1994	4.36	0.050	18.60	37.10	0.258	18.90	65.40	119.00
Aberdeen	Albert 1 and 2 Jetties					CR110	1994	3.52	0.350	19.10	29.60	0.220	24.10	45.20	108.00
Aberdeen	Mathews Quay North					CR110	1994	3.97	0.050	15.10	26.90	0.216	20.00	44.60	84.60
Aberdeen	Mearns Quay East					CR110	1994	4.06	0.270	16.20	27.10	0.180	22.10	45.40	98.10
Aberdeen	Total Quay					CR110	1994	3.84	0.230	13.90	19.00	0.125	18.60	37.50	91.80
Aberdeen	Turning Basin					CR110	1994	4.34	0.330	18.20	25.70	0.384	23.40	48.30	103.00
Aberdeen	Regent Quay					CR110	1994	4.89	0.720	20.20	48.30	0.328	23.40	67.00	161.00
Aberdeen	Upper Regent Dock					CR110	1994	3.67	1.510	40.10	72.20	0.938	18.10	103.00	252.00
Aberdeen	Albert Basin					CR110	1994	6.55	0.480	19.70	51.40	0.220	22.80	74.20	180.00
Aberdeen	Pacific/Atlantic Wharf					CR110	1994	4.86	0.230	17.90	33.10	0.266	23.00	57.20	113.00
Aberdeen	vigation Channel					CR110	1994	3.46	0.050	8.63	8.62	0.097	13.70	21.00	50.80
Aberdeen	Telford Dock					CR110	1994	6.85	0.270	18.40	75.00	0.124	24.10	157.00	201.00
Aberdeen	Navigation Channel					CR110	1995	3.50	0.020	9.07	4.93	0.010	10.80	32.30	39.70
Aberdeen	Navigation Channel					CR110	1995	2.40	0.020	16.10	14.00	0.010	16.50	20.20	52.30
Aberdeen	Torry Berth					CR110	1995	3.30	0.020	10.50	6.86	0.080	9.68	19.40	61.50
Aberdeen	Mearns West Approach					CR110	1995	12.50	0.370	15.70	22.90	0.186	21.50	36.70	128.00
Aberdeen	Telford Dock					CR110	1995	3.70	0.020	9.67	15.80	0.082	14.80	23.10	60.80
Aberdeen	Albert Dock					CR110	1995	10.90	0.600	16.10	30.70	0.179	21.10	41.80	126.00
Aberdeen	Regent Quay					CR110	1995	12.50	0.550	16.50	35.10	0.323	21.70	51.70	134.00
Aberdeen	River Dee Approaches					CR110	1995	8.00	0.540	26.30	25.30	0.100	23.20	51.70	112.00
Aberdeen	Torry Quay					CR110	1996	7.11	0.040	19.60	34.90	0.177	22.20	55.40	147.00
Aberdeen	Texaco Quay					CR110	1996	5.81	0.270	15.40	23.70	0.124	18.50	40.00	103.00
Aberdeen	Regent Quay West End					CR110	1996	7.16	0.590	17.60	44.60	0.132	20.90	60.20	165.00
Aberdeen	Albert Quay, No 2 Jetty					CR110	1996	6.12	0.310	16.40	28.90	0.160	20.10	42.60	117.00
Aberdeen	Abercrombie Jetty					CR110	1996	6.99	0.330	17.90	27.00	0.177	21.30	44.70	112.00
Aberdeen	Upper Dock					CR110	1996	7.42	0.620	19.20	46.80	0.275	20.40	75.90	186.00
Aberdeen	Navigation Channel					CR110	1996	6.56	0.310	15.60	20.70	0.410	18.90	42.00	96.50
Aberdeen	Albert Basin					CR110	1996	3.52	0.070	1.31	1.80	0.039	5.11	3.96	11.20
Aberdeen	Pontoon Berth					CR110	1996	19.30	0.680	39.50	1521.00	0.400	29.30	174.00	927.00

NA = Not Analysed; ND = Not Detected; BDL = Below Detection Limit **Location I**	**Location II**	**LIMS/UKAS No.**	**Lab Sample No.**	**Latitude**	**Longitude**	**Oslo Dump**	**Year**	**As mg/g**	**Cd mg/g**	**Cr mg/g**	**Cu mg/g**	**Hg mg/g**	**Ni mg/g**	**Pb mg/g**	**Zn mg/g**
Aberdeen	Albert Quay					CR110	1996	10.30	0.410	30.00	26.20	0.190	21.60	40.70	113.00
Aberdeen	Pontoon Berth					CR110	1996	15.00	0.550	33.10	17.70	0.270	23.70	75.10	370.00
Aberdeen	Albert Quay					CR110	1996	12.80	0.390	29.80	59.10	0.490	22.40	114.00	170.00
Aberdeen	Total Quay, River Dee					CR110	1998	7.22	0.285	28.90	15.80	0.189	132.00	26.80	76.20
Aberdeen	Telford Dock					CR110	1998	11.00	0.396	37.00	26.90	0.153	174.00	45.20	98.50
Aberdeen	Atlantic Quay, Albert Basin					CR110	1998	12.60	0.508	43.40	29.50	0.115	191.00	47.90	113.00
Aberdeen	Telford Dock					CR110	1998	10.90	0.412	37.50	26.30	0.127	173.00	46.50	100.00
Aberdeen	Navigation Channel					CR110	1998	7.14	0.215	24.80	10.30	0.038	115.00	20.80	57.20
Aberdeen	Total Quay, River Dee					CR110	1998	10.20	0.396	35.50	18.60	0.067	162.00	38.10	86.60
Aberdeen	Regent Quay					CR110	1998	12.70	0.699	40.30	39.40	0.041	178.00	63.60	145.00
Aberdeen	Albert Basin					CR110	1998	9.84	0.471	37.90	29.80	0.225	168.00	43.90	103.00
Aberdeen	Albert Basin					CR110	1998	10.30	0.413	36.60	22.50	0.192	160.00	38.30	91.40
Aberdeen	East end of Pontoon Jetty, Albert capital works					CR110	1999	15.40	0.584	41.20	146.00	0.177	36.20	94.20	422.00
Aberdeen	West end Pontoon jetty, Albert capital works					CR110	1999	14.90	1.450	57.80	135.00	0.473	41.10	94.90	502.00
Aberdeen	North West Corner, Albert capital works					CR110	1999	4.34	0.593	21.40	39.80	0.478	22.30	46.70	162.00
Aberdeen	Outside pontoon jetty, east leg, pontoon jetty works (6)					CR110	1999	10.40	0.615	38.40	52.60	0.241	189.00	50.40	170.00
Aberdeen	Pontoon Jetty (1)					CR110	1999	10.20	0.581	38.60	61.80	0.326	166.00	60.10	234.00
Aberdeen	Pontoon Jetty, No 1 Berth (4)					CR110	1999	31.00	2.660	149.00	11900.00	1.560	84.60	902.00	12300.00
Aberdeen	Pontoon Jetty, Mid West Leg (2)					CR110	1999	26.50	1.590	64.00	778.00	3.690	45.90	388.00	2440.00
Aberdeen	Pontoon Dock 4, below east limb					CR110	1999	2.93	0.147	55.10	38.20	0.170	58.90	29.90	116.00
Aberdeen	Telford Dock					CR110	1999	10.30	0.312	30.10	16.60	0.164	19.80	27.50	76.00
Aberdeen	Channel					CR110	1999	10.60	0.269	32.20	14.40	0.092	34.30	25.60	69.50
Aberdeen	Tidal Harbour					CR110	1999	10.40	0.342	31.00	18.40	0.165	41.60	31.30	81.70
Aberdeen	Turning Basin					CR110	1999	10.80	0.387	33.30	18.70	0.248	42.70	33.30	86.20
Aberdeen	Albert Basin					CR110	1999	12.20	0.456	38.10	26.50	0.167	25.10	37.20	108.00
Aberdeen	Navigation Channel					CR110	1999	8.96	0.242	27.90	12.70	0.106	15.80	23.10	61.70
Aberdeen	Mearns East					CR110	1999	12.40	0.467	39.30	26.90	0.217	29.30	40.80	111.00
Aberdeen	Deep Water Berth, Regent Quay					CR110	1999	9.51	0.583	29.50	35.40	0.176	21.50	46.60	132.00
Aberdeen	Tidal Basin/Pocra					CR110	2000	8.93	0.423	33.00	21.40	0.101	22.60	30.30	104.00
Aberdeen	River Berth					CR110	2000	1.12	0.071	7.42	3.76	0.028	3.39	7.50	28.90
Aberdeen	Atlantic Wharf					CR110	2000	10.70	0.316	39.20	25.50	0.266	25.20	35.40	111.00
Aberdeen	Hall Russells					CR110	2000	9.58	0.372	35.80	33.50	0.087	25.20	37.00	123.00
Aberdeen	Albert Quay, Bunker Berth					CR110	2000	9.78	0.386	33.30	25.40	0.065	23.80	32.50	110.00
Aberdeen	Upper Dock					CR110	2000	10.70	1.030	40.50	82.80	0.429	26.10	122.00	297.00
Aberdeen	Navigation Channel					CR110	2000	7.39	0.082	18.10	4.67	0.047	11.30	9.65	46.40
Aberdeen	Turning Basin/Pilot Jetty					CR110	2000	7.07	0.179	25.00	12.40	0.040	19.10	18.00	71.30
Aberdeen	Off Total Quay					CR110	2001	7.10	0.330	28.90	20.00	0.070	18.00	26.10	71.40
Aberdeen	Russells Quay					CR110	2001	9.80	0.340	35.20	26.60	0.100	23.00	34.50	86.40
Aberdeen	Tidal Harbour					CR110	2001	10.50	0.290	33.50	23.40	0.210	22.70	38.70	84.70
Aberdeen	Albert Basin South					CR110	2001	8.20	0.290	31.90	37.20	0.110	21.30	28.20	87.50
Aberdeen	Regent Quay East					CR110	2001	8.10	0.470	28.70	38.90	0.180	18.80	45.20	118.00
Aberdeen	Atlantic Wharf					CR110	2001	9.10	0.310	33.90	26.10	0.170	23.10	39.60	81.70
Aberdeen	Telford Dock					CR110	2001	11.00	0.270	33.20	22.50	0.100	22.60	33.70	71.90
Aberdeen	Navigation Channel					CR110	2001	7.10	0.186	23.80	9.20	0.048	16.40	17.90	42.90
Aberdeen						CR110	2002	5.11	BDL	23.50	17.90	0.086	13.20	11.60	53.00
Aberdeen						CR110	2002	9.05	1.050	41.30	74.20	0.611	20.40	109.00	234.00
Aberdeen						CR110	2002	7.43	0.298	35.90	23.70	0.158	20.00	27.70	86.00
Aberdeen						CR110	2002	12.00	2.600	51.10	80.70	0.959	28.00	227.00	317.00
Aberdeen						CR110	2002	1.85	BDL	12.70	8.86	0.173	8.82	6.89	29.10
Aberdeen						CR110	2002	7.18	0.445	34.40	21.20	0.115	21.10	32.80	104.00
Aberdeen						CR110	2002	11.00	1.150	55.90	75.80	0.522	24.30	229.00	262.00
Aberdeen						CR110	2002	9.87	0.292	31.70	21.50	0.202	20.50	28.40	81.40
Aberdeen						CR110	2002	7.25	0.276	26.80	15.90	0.155	17.20	24.00	72.60
Aberdeen						CR110	2002	5.98	0.239	23.80	14.00	0.156	15.30	20.70	69.80
Aberdeen						CR110	2002	8.46	0.312	32.20	22.90	0.179	20.90	29.30	86.40
Aberdeen						CR110	2002	10.70	0.261	31.20	38.40	0.160	20.00	31.70	81.00
Aberdeen						CR110	2002	10.20	0.453	45.60	41.80	0.263	26.00	40.90	162.00

NA = Not Analysed; ND = Not Detected; BDL = Below Detection Limit Location I	Location II	LIMS/UKAS No.	Lab Sample No.	Latitude	Longitude	Oslo Dump	Year	As mg/g	Cd mg/g	Cr mg/g	Cu mg/g	Hg mg/g	Ni mg/g	Pb mg/g	Zn mg/g
Aberdeen						CR110	2002								
Aberdeen						CR110	2002								
Aberdeen						CR110	2002								
Aberdeen						CR110	2003	8.72	0.300	35.21	31.54	0.120	21.67	27.06	100.83
Aberdeen						CR110	2003	6.89	0.284	29.77	28.05	0.255	21.34	26.56	86.68
Aberdeen						CR110	2003	10.12	0.327	31.53	36.32	0.209	20.76	30.15	103.69
Aberdeen						CR110	2004								
Aberdeen						CR110	2004								
Aberdeen						CR110	2004								
Aberdeen						CR110	2004								
Aberdeen						CR110	2004								
Aberdeen						CR110	2004								
Aberdeen						CR110	2004								
Aberdeen						CR110	2004								
Aberdeen						CR110	2004								
Aberdeen			01/2005/DS/O	57° 08.5927'N	002° 05.2257'W	CR110	2005	1.47	BDL	10.10	9.57	BDL	8.38	7.69	37.51
Aberdeen			02/2005/DS/O	57° 08.5707'N	002° 05.0818'W	CR110	2005	7.70	0.289	32.03	29.77	0.178	21.01	30.34	91.50
Aberdeen			03/2005/DS/O	57° 08.5732'N	002° 05.2345'W	CR110	2005	2.22	BDL	14.37	13.02	BDL	10.17	9.46	33.44
Aberdeen			04/2005/DS/O	57° 08.5534'N	002° 05.1016'W	CR110	2005	10.24	0.470	33.02	55.32	0.228	21.64	43.75	130.58
Aberdeen			05/2005/DS/O			CR110	2005	5.66	BDL	19.74	9.56	0.129	14.56	14.24	49.42
Aberdeen Beach Recharge	Aberdeen Beach Recharge	1320/06	56/2006/DS/O	56° 42.16'N	002° 27.95'W	N/A	2006								
Aberdeen Beach Recharge	Aberdeen Beach Recharge	1322/06	58/2006/DS/O	56° 42.23'N	002° 27.24'W	N/A	2006								
Aberdeen Beach Recharge	Aberdeen Beach Recharge	1324/06	60/2006/DS/O	56° 42.17'N	002° 25.95'W	N/A	2006								
Aberdeen Beach Recharge	Aberdeen Beach Recharge	1326/06	62/2006/DS/O	56° 42.20'N	002° 27.95'W	N/A	2006								
Aberdeen Beach Recharge	Aberdeen Beach Recharge	1328/06	64/2006/DS/O	56° 42.16'N	002° 27.24'W	N/A	2006								
Aberdeen Beach Recharge	Aberdeen Beach Recharge	1330/06	66/2006/DS/O	56° 42.16'N	002° 27.24'W	N/A	2006								
Aberdeen Beach Recharge	Aberdeen Beach Recharge	1332/06	68/2006/DS/O	56° 42.23'N	002° 27.95'W	N/A	2006								
Aberdeen	Aberdeen Harbour	1348/07	30/2007/DS/O	57 08.68 N	02 04.67 W	CR110	2007	8.95	0.287	36.10	28.30	0.099	22.60	28.70	78.50
Aberdeen	Aberdeen Harbour	1349/07	31/2007/DS/O	E395374	N805981	CR110	2007	8.91	0.298	37.70	31.00	0.092	22.90	29.00	83.10
Aberdeen	Aberdeen Harbour	1350/07	32/2007/DS/O	E395474	N805915	CR110	2007	8.97	0.317	37.70	30.10	BDL	22.80	29.80	82.70
Aberdeen	Aberdeen Harbour	1351/07	33/2007/DS/O	57 08.65 N	02 04.75 W	CR110	2007	10.10	0.337	39.20	26.00	BDL	23.50	29.80	82.60
Aberdeen	Aberdeen Harbour	1352/07	34/2007/DS/O	57 08 56 N	02 04.40 W	CR110	2007	9.37	0.315	38.60	25.00	0.103	23.40	30.30	82.60
Aberdeen	Aberdeen Harbour	1353/07	35/2007/DS/O	57 08.43 N	02 05.04 W	CR110	2007	7.39	0.313	33.40	20.90	0.063	20.30	26.50	76.60
Aberdeen	Aberdeen Harbour	1354/07	36/2007/DS/O	E395178	N805316	CR110	2007	8.94	0.407	38.40	28.00	0.091	23.50	32.80	90.20
Aberdeen	Aberdeen Harbour	1355/07	37/2007/DS/O	57 08.42 N	02 04.68 W	CR110	2007	8.31	0.339	36.10	22.10	BDL	21.60	28.20	79.60
Aberdeen	Aberdeen Harbour	1356/07	38/2007/DS/O	E395534	N805561	CR110	2007	7.35	BDL	31.70	17.10	BDL	20.10	23.80	66.40
Aberdeen	Aberdeen Harbour	1357/07	39/2007/DS/O	E385474	E805633	CR110	2007	8.84	0.304	36.20	23.50	BDL	22.50	27.90	79.10
Aberdeen	Navigation Channel	1315/07	19/2007/DS/O	396391E	805979N	CR110	2007	5.51	BDL	15.00	3.92	BDL	10.10	9.42	27.50
Aberdeen	Navigation Channel	1316/07	20/2007/DS/O	396164E	805832N	CR110	2007	4.21	BDL	12.70	3.72	BDL	6.86	7.53	21.00
Aberdeen	Navigation Channel	1317/07	21/2007/DS/O	396369E	805926N	CR110	2007	5.14	BDL	16.80	5.15	BDL	9.60	8.47	31.30
Aberdeen			45/2008/DS	N 805520	E 395686	CR110	2008								
Aberdeen			46/2008/DS	N 805944	E 395491	CR110	2008								
Aberdeen			47/2008/DS	N 805280	E 395819	CR110	2008								
Aberdeen			48/2008/DS	N 805745	E 395126	CR110	2008								
Aberdeen			50/2008/DS	N 805565	E 395539	CR110	2008								
Aberdeen			51/2008/DS	N 805506	E 395338	CR110	2008								
Aberdeen			52/2008/DS	N 805647	E 395363	CR110	2008								
Aberdeen			53/2008/DS	N 805840	E 396212	CR110	2008								
Aberdeen			54/2008/DS	N 806167	E 396479	CR110	2008								
Aberdeen			55/2008/DS			CR110	2008								
Aberdeen Navigation Channel	0-0.5m	N/A	V1	57 08.250	02 04.230	CR110	2012	6.14	0.150	27.80	12.22	0.080	15.44	15.49	48.76
Aberdeen Navigation Channel	0.5-1.0m	N/A	V1	57 08.250	02 04.230	CR110	2012	6.91	0.210	28.96	15.07	0.050	15.80	17.38	54.97
Aberdeen Navigation Channel	1.0-1.5m	N/A	V1	57 08.250	02 04.230	CR110	2012	8.56	0.190	30.19	12.76	0.040	17.06	19.60	56.44
Aberdeen Navigation Channel	0-0.5m	N/A	V2	57 08.433	02 04.257	CR110	2012	5.06	0.190	24.67	10.48	0.040	13.28	17.01	51.65
Aberdeen Navigation Channel	0.5-1.24m	N/A	V2	57 08.433	02 04.257	CR110	2012	6.78	0.350	24.85	12.85	0.110	14.47	34.51	67.81
Aberdeen Navigation Channel	1.24-1.74m	N/A	V2	57 08.433	02 04.257	CR110	2012	6.95	0.700	29.78	16.15	0.160	16.80	41.52	77.38
Aberdeen Navigation Channel	0-0.5m	N/A	V3	57 08.481	02 04.132	CR110	2012	4.63	0.140	22.27	9.57	0.060	11.84	16.58	41.00

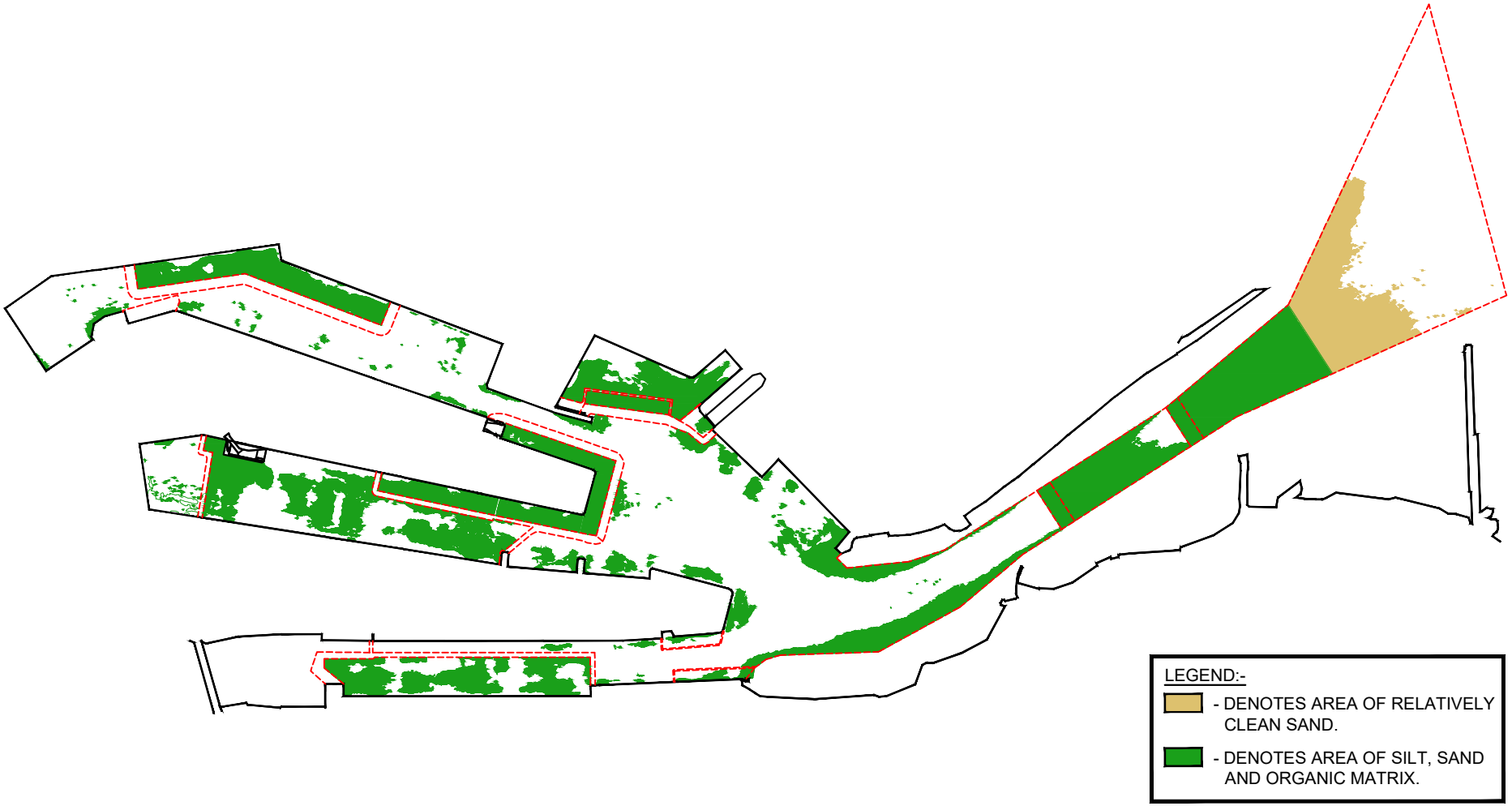
NA = Not Analysed; ND = Not Detected; BDL = Below Detection Limit Location I	Location II	LIMS/UKAS No.	Lab Sample No.	Latitude	Longitude	Oslo Dump	Year	As mg/g	Cd mg/g	Cr mg/g	Cu mg/g	Hg mg/g	Ni mg/g	Pb mg/g	Zn mg/g
Aberdeen Navigation Channel	1.0-1.57m	N/A	V3	57 08.481	02 04.132	CR110	2012	4.92	0.230	22.19	11.95	0.570	14.10	33.33	54.71
Aberdeen Navigation Channel	0-0.36m	N/A	V4	57 08.558	02 03.938	CR110	2012	4.52	0.120	21.49	7.56	0.260	11.33	11.22	36.05
Aberdeen Navigation Channel	0.36-0.86m	N/A	V4	57 08.558	02 03.938	CR110	2012	5.62	0.140	21.94	10.03	0.180	12.21	12.81	39.79
Aberdeen Navigation Channel	0.86-1.36m	N/A	V4	57 08.558	02 03.938	CR110	2012	5.49	0.260	24.16	10.31	0.190	13.66	23.14	53.79
Aberdeen Navigation Channel	0-0.5m	N/A	V5	57 08.620	02 03.768	CR110	2012	5.30	0.030	9.16	2.38	0.060	4.01	5.53	16.58
Aberdeen Navigation Channel	0.5-1.07m	N/A	V5	57 08.620	02 03.768	CR110	2012	4.79	0.040	9.97	3.58	0.100	5.10	7.57	19.77
Aberdeen Navigation Channel	0.5-1.17m	N/A	V6	57 08.400	02 03.350	CR110	2012	5.46	0.060	11.68	2.87	0.070	5.87	7.12	24.23
Aberdeen Navigation Channel	0-0.5m	N/A	VC6	57 08.400	02 03.350	CR110	2012	6.58	0.040	11.82	2.90	0.040	5.83	6.88	22.92
Aberdeen Navigation Channel	Grab	N/A	G1	57 08.604	02 03.932	CR110	2012	6.81	0.070	14.14	4.15	0.040	7.53	9.61	28.02
Aberdeen Navigation Channel	Grab	N/A	G2	57 08.689	02 03.688	CR110	2012	6.48	0.090	20.87	5.32	0.120	11.52	11.23	31.09
Aberdeen Navigation Channel	Grab	N/A	G3	57 08.771	02 03.541	CR110	2012	5.79	<0.03	8.44	1.53	0.050	3.50	5.38	14.29
Aberdeen Navigation Channel	Grab	N/A	G4	57 08.743	02 03.411	CR110	2012	5.94	<0.03	7.22	1.53	0.040	3.22	4.50	12.50
Aberdeen Navigation Channel	Grab	N/A	G5	57 08.814	02 03.371	CR110	2012	6.35	<0.03	12.51	1.75	<0.03	4.26	5.77	14.88
Aberdeen Navigation Channel	Grab	N/A	G6	57 08.845	02 03.408	CR110	2012	6.17	<0.03	12.53	1.80	0.030	4.39	6.88	15.40
Aberdeen		54/2012/DS	MAR-2012-6256	57.1454 N	2.0600 W	CR110	2012	4.60	0.029	9.323	2.45	0.059	5.07	6.19	21.31
Aberdeen		55/2012/DS	MAR-2012-5874	57 8.6274 N	02 3.8266 W	CR110	2012	6.63	0.116	50.825	31.58	0.059	47.25	18.92	82.64
Aberdeen		56/2012/DS	MAR-2012-6257	57.1432 N	2.0646 W	CR110	2012	6.01	0.089	46.617	29.24	0.059	38.17	19.19	84.37
Aberdeen		57/2012/DS	MAR-2012-5875	57 8.8562 N	02 3.3729 W	CR110	2012	7.03	0.287	26.974	17.42	0.115	16.12	29.97	75.76
Aberdeen		58/2012/DS	MAR-2012-5876	57 8.7003 N	02 3.5818 W	CR110	2012	0.00	0.000	0.000	0.00	0.000	0.00	0.00	0.00
Aberdeen		59/2012/DS	MAR-2012-5877	57 8.7694 N	02 3.3390 W	CR110	2012	9.14	0.287	29.577	16.08	0.113	17.93	29.59	78.66
Aberdeen		60/2012/DS	MAR-2012-5878	57 8.4299 N	02 4.2982 W	CR110	2012	0.00	0.000	0.000	0.00	0.000	0.00	0.00	0.00
Aberdeen		61/2012/DS	MAR-2012-6258	57.1420 N	2.0670 W	CR110	2012	0.00	0.000	0.000	0.00	0.000	0.00	0.00	0.00
Aberdeen		62/2012/DS	MAR-2012-5879	57 8.48823 N	02 4.1159 W	CR110	2012	0.00	0.000	0.000	0.00	0.000	0.00	0.00	0.00
Aberdeen		63/2012/DS	MAR-2012-6259	57.1428 N	2.0655 W	CR110	2012	6.05	0.054	42.172	27.32	0.059	38.53	15.57	72.78
Aberdeen		64/2012/DS	MAR-2012-6260	57.1403 N	2.0732 W	CR110	2012	3.16	0.029	26.058	18.79	0.059	19.57	8.11	45.95
Aberdeen		65/2012/DS	MAR-2012-6261	57.1448 N	2.0617 W	CR110	2012	4.42	0.026	8.894	4.12	0.059	4.54	4.76	18.74
Aberdeen		66/2012/DS	MAR-2012-5880	57 8.6437 N	02 3.6393 W	CR110	2012	5.13	0.082	20.319	16.02	0.059	15.67	13.04	44.53
Aberdeen		67/2012/DS	MAR-2012-5881	57 8.7381 N	02 3.4054 W	CR110	2012	3.90	0.045	13.944	20.22	0.059	10.53	17.51	28.92
Aberdeen		68/2012/DS	MAR-2012-5882	57 8.9203 N	02 3.4553 W	CR110	2012	8.53	0.130	32.179	12.89	0.116	19.59	22.50	59.83
Aberdeen	Aberdeen	MAR-2012-6256	54/2012/DS	57.1454 N	2.0600 W	CR110	2012								
Aberdeen	Aberdeen	MAR-2012-5874	55/2012/DS	57 8.6274 N	02 3.8266 W	CR110	2012	4.16	0.035	9.97	2.67	0.059	5.39	6.38	20.27
Aberdeen	Aberdeen	MAR-2012-6257	56/2012/DS	57.1432 N	2.0646 W	CR110	2012								
Aberdeen	Aberdeen	MAR-2012-5875	57/2012/DS	57 8.8562 N	02 3.3729 W	CR110	2012	4.60	0.029	9.32	2.45	0.059	5.07	6.19	21.31
Aberdeen	Aberdeen	MAR-2012-5876	58/2012/DS	57 8.7003 N	02 3.5818 W	CR110	2012	6.63	0.116	50.83	31.58	0.059	47.25	18.92	82.64
Aberdeen	Aberdeen	MAR-2012-5877	59/2012/DS	57 8.7694 N	02 3.3390 W	CR110	2012	6.01	0.089	46.62	29.24	0.059	38.17	19.19	84.37
Aberdeen	Aberdeen	MAR-2012-5878	60/2012/DS	57 8.4299 N	02 4.2982 W	CR110	2012	7.03	0.287	26.97	17.42	0.115	16.12	29.97	75.76
Aberdeen	Aberdeen	MAR-2012-6258	61/2012/DS	57.1420 N	2.0670 W	CR110	2012								
Aberdeen	Aberdeen	MAR-2012-5879	62/2012/DS	57 8.48823 N	02 4.1159 W	CR110	2012	9.14	0.287	29.58	16.08	0.113	17.93	29.59	78.66
Aberdeen	Aberdeen	MAR-2012-6259	63/2012/DS	57.1428 N	2.0655 W	CR110	2012								
Aberdeen	Aberdeen	MAR-2012-6260	64/2012/DS	57.1403 N	2.0732 W	CR110	2012								
Aberdeen	Aberdeen	MAR-2012-6261	65/2012/DS	57.1448 N	2.0617 W	CR110	2012								
Aberdeen	Aberdeen	MAR-2012-5880	66/2012/DS	57 8.6437 N	02 3.6393 W	CR110	2012	6.05	0.054	42.17	27.32	0.059	38.53	15.57	72.78
Aberdeen	Aberdeen	MAR-2012-5881	67/2012/DS	57 8.7381 N	02 3.4054 W	CR110	2012	3.16	0.029	26.06	18.79	0.059	19.57	8.11	45.95
Aberdeen	Aberdeen	MAR-2012-5882	68/2012/DS	57 8.9203 N	02 3.4553 W	CR110	2012	4.42	0.026	8.89	4.12	0.059	4.54	4.76	18.74

Appendix 4
Marine Scotland sediment sampling analysis of Aberdeen offshore disposal site (1995 – 2011)

Marine Scotland CR110 disposal site heavy metal sampling results 1995 - 2011

No	Site Name	Year	Field ID	UKAS/LIMS No	Depth	Date	Latitude	Longitude	As mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg	Mean Dia. mm	Median Dia mm	Sorting Coef.	Skewness	Kurtosis	PSA <20µm (%)	PSA <63µm (%)	Visual Description
9	Aberdeen	1995	9ABZ95	465/97		26-Sep-95	57°06.754'N	001°59.834'W	6.04	0.050	4.88	8.54	0.030	4.24	20.18	39.77	0.529	0.525	1.91	-0.04	1.25		6.40	
8	Aberdeen	1995	8ABZ95	464/97		26-Sep-95	57°06.871'N	001°59.858'W	5.36	0.040	4.30	9.22	0.030	4.29	19.55	36.45	0.297	0.330	1.74	0.10	1.66		11.00	
7	Aberdeen	1995	7ABZ95	463/97		26-Sep-95	57°07.116'N	001°59.994'W	6.09	0.040	3.03	4.98	0.100	2.74	12.20	22.21	0.299	0.312	0.76	-0.02	1.26		3.40	
6	Aberdeen	1995	6ABZ95	462/97		26-Sep-95	57°07.255'N	001°59.999'W	6.73	0.030	5.39	9.02	0.070	4.76	22.42	43.88	0.275	0.301	1.82	0.02	2.12		12.10	
5	Aberdeen	1995	5ABZ95	461/97		26-Sep-95	57°07.045'N	001°59.540'W	7.61	0.020	3.12	3.34	0.050	3.91	11.45	20.27	0.312	0.306	1.03	-0.17	1.41		3.90	
4	Aberdeen	1995	4ABZ95	460/97		26-Sep-95	57°07.019'N	001°59.740'W	5.65	0.070	4.14	5.88	0.020	3.45	14.03	27.14	0.363	0.339	1.02	-0.25	1.27		2.50	
3	Aberdeen	1995	3ABZ95	459/97		26-Sep-95	57°07.015'N	001°59.934'W	7.32	0.040	4.37	3.32	0.010	3.63	8.73	23.52	0.183	0.252	1.29	0.51	1.58		13.10	
2	Aberdeen	1995	2ABZ95	458/97		26-Sep-95	57°07.022'N	002°00.243'W	7.00	0.060	4.88	6.03	0.050	4.19	14.60	28.37	0.192	0.253	1.68	0.39	1.89		15.80	
1	Aberdeen	1995	1ABZ95	457/97		26-Sep-95	57°07.058'N	002°00.342'W	6.98	0.030	3.60	4.41	0.030	4.25	13.83	25.10	0.316	0.312	0.84	-0.15	1.31		2.80	
2	Aberdeen	2006	15ABZ2006	1839/06		7-Apr-06	57 11.610N	2 0.807W	4.95	BDL	13.47	2.74	BDL	6.69	6.32	19.10								Medium sand anaerobic at depth
3	Aberdeen	2006	14ABZ2006	1838/06		7-Apr-06	57 11.601N	2 1.611W	5.02	BDL	12.62	2.75	BDL	6.82	6.42	19.60								Fine-Medium Sand anaerobic at depth
4	Aberdeen	2006	13ABZ2006	1837/06		7-Apr-06	57 11.448N	2 2.754W	4.32	BDL	14.18	2.64	0.079	5.97	5.92	17.19								Medium Sand
5	Aberdeen	2006	12ABZ2006	1836/06		7-Apr-06	57 12.368N	2 0.486W	4.84	BDL	16.28	3.78	BDL	8.68	8.63	25.47								Fine-Medium sand anaerobic with depth
6	Aberdeen	2006	11ABZ2006	1835/06		7-Apr-06	57 12.280N	2 1.330W	4.83	BDL	19.98	3.81	BDL	8.89	8.39	24.87								Medium sand anaerobic at depth
7	Aberdeen	2006	10ABZ2006	1834/06		7-Apr-06	57 12.143N	2 2.357W	4.22	BDL	16.97	2.54	BDL	5.83	5.80	16.58								Medium Sand
8	Aberdeen	2006	9ABZ2006	1833/06		7-Apr-06	57 12.024N	2 0.627W	4.81	BDL	18.29	4.17	BDL	9.38	8.84	26.96								Fine_medium sand anaerobic at depth
9	Aberdeen	2006	8ABZ2006	1832/06		7-Apr-06	57 11.919N	2 1.521W	4.38	BDL	14.85	3.11	BDL	7.53	7.12	20.95								Medium Sand anaerobic at depth
10	Aberdeen	2006	7ABZ2006	1831/06		7-Apr-06	57 11.817N	2 2.529W	4.44	BDL	14.42	2.04	BDL	5.83	5.56	16.04								Medium Sand
11	Aberdeen	2006	6ABZ2006	1830/06		7-Apr-06	57 11.212N	2 0.952W	6.06	BDL	13.86	3.25	BDL	7.17	7.52	20.69								Medium sand anaerobic at depth
12	Aberdeen	2006	5ABZ2006	1829/06		7-Apr-06	57 11.137N	2 1.941W	5.02	BDL	16.85	3.68	BDL	8.04	8.10	22.69								Fine -Medium Sand Aanerobic below the surface
13	Aberdeen	2006	4ABZ2006	1828/06		7-Apr-06	57 11.043N	2 2.932W	4.16	BDL	13.80	2.22	BDL	6.68	6.14	23.28								Medium Sand
14	Aberdeen	2006	3ABZ2006	1827/06		7-Apr-06	57 12.650N	2 0.383W	5.04	BDL	20.72	4.58	BDL	10.08	10.22	29.39								Medium sand anaerobic at depth
15	Aberdeen	2006	2ABZ2006	1826/06		7-Apr-06	57 12.580N	2 1.225W	4.41	BDL	15.01	2.88	BDL	7.32	6.72	22.27								Medium sand anaerobic at depth
1	Aberdeen	2006	1ABZ2006	1825/06		7-Apr-06	57 12.510N	2 2.050W	4.27	BDL	14.09	2.01	BDL	5.85	5.46	20.65								Medium Sand
6	Aberdeen	2011	6/ABN/11	1737/2011		13-May-11	57.1146	-2.0010	5.51	0.029	6.65	9.42	0.059	3.41	4.18	19.58	0.278	0.258	0.65	0.06	1.06	1.793	4.143	
5	Aberdeen	2011	2/ABN/11	1734/2011		13-May-11	57.1197	-2.0014	3.94	0.023	5.32	2.22	0.059	3.25	3.46	13.59	0.414	0.351	0.78	-0.05	1.01	1.055	2.55	
4	Aberdeen	2011	4/ABN/11	1732/2011		13-May-11	57.1172	-2.0050	8.42	0.059	14.78	5.20	0.059	8.13	10.31	27.58	0.111	0.054	1.97	0.0	0.98	20.1	54.9	Sandy Mud
3	Aberdeen	2011	1/ABN/11	1731/2011		13-May-11	57.1170	-2.0010	3.78	0.043	8.55	4.13	0.059	5.25	4.91	24.26	0.200	0.177	2.1	0.53	1.23	15.666	25.944	
2	Aberdeen	2011	10/ABN/11	1728/2011		13-May-11											0.249	0.236	1.29	0.43	1.49	4.175	14.653	Muddy Sand
1	Aberdeen	2011	12/ABN/11	1727/2011		13-May-11																		
2	Aberdeen	2007	5ABZ2007	1504/07	56	5-Apr-07											0.320	0.276	1.27	0.27	1.54	4.26	10.10	8cm Grey brown Silty Sand
3	Aberdeen	2007	4ABZ2007	1503/07	48	5-Apr-07			4.25	BDL	7.27	2.74	BDL	5.49	5.40	16.70	0.432	0.373	0.78	-0.02	0.95	0.00	1.02	6cm Grey brown Sand and small stones
4	Aberdeen	2007	8ABZ2007	1502/07	44	5-Apr-07			4.84	BDL	10.60	4.01	BDL	6.54	6.45	22.50	0.343	0.298	0.69	-0.06	1.01	0.04	1.47	5cm Grey brown Sand
5	Aberdeen	2007	9ABZ2007	1501/07	43	5-Apr-07											0.387	0.347	0.72	0.00	1.00	1.26	3.12	9cm Choc brown Sand and shell fragments
6	Aberdeen	2007	7ABZ2007	1500/07	49	5-Apr-07											0.466	0.438	0.54	0.01	0.94	0.00	0.00	5cm Choc brown Sand
7	Aberdeen	2007	6ABZ2007	1499/07	46	5-Apr-07			4.46	BDL	8.74	5.98	BDL	5.76	6.48	20.90	0.383	0.320	0.79	-0.07	0.98	0.03	1.33	7cm Choc brown Sand (anoxic at depth)
8	Aberdeen	2007	1ABZ2007	1498/07	43	5-Apr-07			3.24	BDL	7.58	4.41	BDL	5.50	5.57	27.00	0.368	0.319	0.78	-0.01	0.99	1.14	2.85	5cm Grey brown Sand
9	Aberdeen	2007	2ABZ2007	1497/07	41	5-Apr-07			4.06	BDL	8.92	5.90	BDL	5.90	5.42	26.30	0.414	0.341	0.82	-0.08	0.97	0.03	1.23	4cm Grey brown Sand
1	Aberdeen	2007	3ABZ2007	1496/07	43	5-Apr-07											0.344	0.312	0.64	-0.02	0.97	0.00	1.44	6cm Grey brown Sand
32	Aberdeen	2002	32/ABZ/02	14148-02-SED					6.18	NA	9.43	4.62	0.052	5.38	13.60	34.20	0.297	0.323	0.04	0.94	0.71		3.90	
31	Aberdeen	2002	31/ABZ/02	14147-02-SED					5.99	NA	9.94	4.18	0.069	5.69	9.19	41.60	0.277	0.310	0.20	1.38	0.83		5.00	
30	Aberdeen	2002	30/ABZ/02	14146-02-SED					5.61	NA	15.60	11.30	0.057	9.19	12.70	42.70	0.178	0.214	0.27	0.99	1.27		13.30	
29	Aberdeen	2002	29/ABZ/02	14145-02-SED					5.81	NA	7.70	2.00	NA	4.34	5.57	16.00	0.311	0.328	0.01	0.93	0.67		2.70	
28	Aberdeen	2002	28/ABZ/02	14144-02-SED					8.92	NA	9.02	2.90	NA	4.09	9.42	19.80	0.285	0.308	0.04	1.06	0.63		3.50	
27	Aberdeen	2002	27/ABZ/02	14143-02-SED					5.86	NA	14.90	18.70	0.067	9.15	12.10	38.20	0.232	0.292	0.34	1.35	1.27		11.40	
26	Aberdeen	2002	26/ABZ/02	14142-02-SED					5.78	NA	18.60	10.10	0.088	10.90	17.20	47.20	0.118	0.173	0.41	0.93	1.72		28.10	
25	Aberdeen	2002	25/ABZ/02	14141-02-SED					3.61	NA	16.50	9.82	0.054	10.00	8.83	35.60	0.123	0.285	0.64	0.72	2.61		32.40	
24	Aberdeen	2002	24/ABZ/02	14140-02-SED					8.40	NA	26.00	11.10	0.153	16.20	21.10	49.90	0.079	0.071	-0.04	0.83	2.14		47.60	
23	Aberdeen	2002	23/ABZ/02	14139-02-SED					5.19	NA	16.40	9.24	0.077	9.51	11.80	41.80	0.181	0.504	0.88	1.11	2.41		23.40	
22	Aberdeen	2002	22/ABZ/02	14138-02-SED					7.17	0.205	16.60	2.70	0.078	10.30	25.90	410.00	0.141	0.206	0.42	0.97	1.68		24.10	
21	Aberdeen	2002	21/ABZ/02	14137-02-SED					3.91	NA	13.90	6.76	0.057	8.19	8.64	33.90	0.209	0.306	0.52	1.26	1.63		16.80	
20	Aberdeen	2002	20/ABZ/02	14136-02-SED					2.67	NA	9.37	4.32	NS	5.71	5.82	20.20	0.278	0.385	0.49	1.54	1.21		10.00	
19	Aberdeen	2002	19/ABZ/02	14135-02-SED					5.36	NA	11.00	3.41	0.060	6.06	6.38	22.40	0.251	0.290	0.23	1.53	0.92		6.30	
18	Aberdeen	2002	18/ABZ/02	14134-02-SED					3.45	NA	7.62	3.49	0.061	4.89	17.30	19.70	0.301	0.342	0.25	1.35	0.91		5.20	
17	Aberdeen	2002	17/ABZ/02	14133-02-SED					5.64	NA	12.30	34.90	0.064	6.98	8.20	26.60	0.192	0.264	0.48	1.84	1.33		13.10	
16	Aberdeen	2002	16/ABZ/02	14132-02-SED					6.14	0.192	19.80	10.20	0.325	11.70	16.50	52.00	0.105	0.142	0.30	0.88	1.86		33.60	
15	Aberdeen	2002	15/ABZ/02	14131-02-SED					3.15	NA	12.10	6.13	0.051	6.89	6.85	29.40	0.175	0.261	0.46	0.91	1.82		21.10	
14	Aberdeen	2002	14/ABZ/02	14130-02-SED					6.03	NA	11.10	4.72	NA	6.57	8.47	26.20	0.198	0.269	0.46	1.79	1.36		14.00	
13	Aberdeen	2002	13/ABZ/02	14129-02-SED					5.16	NA	15.70	10.80	0.064	9.64	13.70	48.00	0.124	0.190	0.38	0.84	1.96		30.90	
12	Aberdeen	2002	12/ABZ/02	14128-02-SED					6.09	0.190	18.10	10.20	0.081	10.40	14.70	47.10	0.153	0.189	0.26	0.97	1.43		18.20	
11	Aberdeen	2002	11/ABZ/02	14127-02-SED					4.94	NA	18.10	9.01	0.065	10.10	16.80	48.60	0.109	0.165	0.39	0.89	1.97		32.10	
10	Aberdeen	2002	10/ABZ/02	14126-02-SED					6.35	NA	13.60	9.35	0.068	11.00	28.50	75.80	0.142	0.212	0.41	0.94	1.94		24.70	
9	Aberdeen	2002	9/ABZ/02	14125-02-SED					4.56	NA	18.50	6.27	0.062	9.36	20.10	36.40	0.109	0.154	0.34	0.94	1.99		30.80	
8	Aberdeen	2002	8/ABZ/02	14124-02-SED					8.19	NA	17.60	5.96	0.088	9.11	12.30	34.30	0.108	0.156	0.34	0.90	2.01		32.00	
7	Aberdeen	2002	7/ABZ/02	14123-02-SED					5.26	NA	20.00	5.95	0.052	10.60	11.60	37.60	0.089	0.109	0.21	0.99	1.94		35.10	
6	Aberdeen	2002	6/ABZ/02	14122-02-SED					6.56	NA	20.20	4.66	0.053	9.23	12.10	34.80	0.146	0.174	0.22	1.05	1.42		17.90	
5	Aberdeen	2002	5/ABZ/02	14121-02-SED					14.00	NA	17.50	2.51	NS	6.19	9.47	26.50	0.249	0.340	0.45	1.57	1.33		10.40	
4	Aberdeen	2002	4/ABZ/02	14120-02-SED					8.44	NA	15.80	9.31	0.058	8.51	12.60	36.40	0.140	0.207	0.40	0.84	2.02		26.30	
3	Aberdeen	2002	3/ABZ/02	14119-02-SED					8.53	NA	11.70	4.58	0.051	6.33	10.40	26.40	0.241	0.315	0.38	1.58	1.29		10.80	
2	Aberdeen	2002	2/ABZ/02	14118-02-SED					6.39	NA	22.00	10.80	0.115	12.30	15.30	50.80	0.105	0.151	0.35	0.89	1.90		33.10	

Appendix 5
Map showing riverbed material type dredged 2015 – 2020



AHB Dwg:- SK01054-01	Aberdeen Harbour - Showing 2015 Areas of Maintenance Dredgings	Scale 1:10,000

AHB Dwg:- SK01054-02	Aberdeen Harbour - Showing 2016 Areas of Maintenance Dredgings	Scale 1:10,000

AHB Dwg:- SK01054-03	Aberdeen Harbour - Showing 2017 Areas of Maintenance Dredgings	Scale 1:10,000

AHB Dwg:- SK01054-04	Aberdeen Harbour - Showing 2018 Areas of Maintenance Dredgings	Scale 1:10,000

AHB Dwg:- SK01054-05	Aberdeen Harbour - Showing 2019 Areas of Maintenance Dredgings	Scale 1:10,000

AHB Dwg:- SK01054-06	Aberdeen Harbour - Showing 2020 Areas of Maintenance Dredgings	Scale 1:10,000

Appendix 6
Correspondence with Aberdeenshire Council regarding beach recharge

From: <REDACTED>
To: <REDACTED>
Cc: <REDACTED>; <REDACTED>; <REDACTED>
Subject: RE: Aberdeen Harbour Board - dredged material
Date: 19 August 2021 18:13:29
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image007.png

Hello <REDACTED>,

Hope you are keeping well.
I would confirm that our position has not changed and we currently have no use for any dredged material.

Thank you.

Regards,
<REDACTED>

Principal Engineer
Flood Risk & Coast Protection
Infrastructure Services
Aberdeenshire Council
Telephone – 01467 539407

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Follow us at:

From: <REDACTED>
Sent: 19 August 2021 15:12
To: <REDACTED>>
Cc: <REDACTED>; <REDACTED>; <REDACTED> **Subject:** RE: Aberdeen Harbour Board - dredged material

Dear <REDACTED>,

I hope you're well. It's that time of year again when we're applying to renew our marine licence application for depositing dredged material at sea.

Could you please let me know whether your position below remains the same regarding potential uses of the dredged material?

Many thanks,
<REDACTED>

<REDACTED>
Environmental Advisor

T:01224 97000
M: <REDACTED>

From: <REDACTED>
Sent: 11 November 2020 11:48
To: <REDACTED>
Cc: <REDACTED>; <REDACTED>; <REDACTED> **Subject:** RE: Aberdeen Harbour Board - dredged material

Dear <REDACTED>,

Thank you for contacting me again. I would confirm that our position has not changed and we currently have no use for any dredged material. As below, we will contract you if we see a use emerge for this material.

Regards,
<REDACTED>

Principal Engineer
Flood Risk & Coast Protection
Infrastructure Services
Aberdeenshire Council
Telephone – 01467 539407

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Follow us at:

From: <REDACTED>
Sent: 11 November 2020 10:43
To: <REDACTED>
Cc: <REDACTED>
Subject: RE: Aberdeen Harbour Board - dredged material

Dear <REDACTED>,

You may recall we spoke back in 2018 about the potential use of dredged material from Aberdeen Harbour's annual maintenance dredging campaign for Aberdeenshire Council projects, for example coastal protection, beach recharge, construction projects etc. See email trail below for reference.

We are seeking to renew our marine licence with Marine Scotland and I would be grateful if you could please confirm whether your position below remains the same. If you do see a potential need for material within the next 18 months perhaps you could give me a call on <REDACTED> to discuss.

Many thanks in advance,
<REDACTED>

<REDACTED>
Environmental Advisor

T: 01224 597000
M: <REDACTED>

From:<REDACTED>

Sent: 01 February 2018 23:37
To: <REDACTED> **Subject:** RE: Aberdeen Harbour Board - dredged material

Many thanks <REDACTED>, much appreciated.

Regards,
<REDACTED>

From: <REDACTED>
Sent: 01 February 2018 13:58
To: <REDACTED>
Subject: FW: Aberdeen Harbour Board - dredged material

Dear <REDACTED>,

Further to our telephone conversation earlier today, I would confirm that we have no change in opinion from that stated in our previous letter dated 15th July 2015. We currently have no use for any dredged material.

Thank you for contacting us again regarding this matter.

Regards,
<REDACTED>

Principal Engineer
Flood Risk & Coast Protection
Infrastructure Services
Aberdeenshire Council
Telephone – 01467 539407

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Follow us at:

From: <REDACTED>
Sent: 01 February 2018 09:44
To: <REDACTED>
Subject: Aberdeen Harbour Board - dredged material

Dear <REDACTED>,

Good to talk to you just now. As discussed, I'd be grateful if you could confirm by return of email that Aberdeenshire Council's position has not changed since <REDACTED>'s attached letter dated 15 July 2015 – i.e. you do not have any current plans that would make use of dredged material.

Many thanks,
<REDACTED>

<REDACTED>
Aberdeen Harbour Board
16 Regent Quay
Aberdeen, AB11 5SS
Tel: 01224 597000
Mob: <REDACTED>

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Or Subscribe to receive progress updates about our South Harbour expansion.